

Vitamins and Supplements: Taken For Health Or Taken For A Ride?

John R. White Jr., PA-C, Pharm.D. Professor of Pharmacotherapy WSU, College of Pharmacy, Spokane Dr. White has been extensively involved in the field of diabetes since 1987. He has published two books, 17 book chapters, and over 70 manuscripts on the topic of diabetes. He has secured over \$1,500,000 in diabetes-related research grants and has received numerous awards, including Teacher of the Year at Washington State University, College of Pharmacy in 1992 and 1996. Currently, he is serving as a diabetes consultant and primary care provider at the Indian Health Service Clinic in Wellpinit, Washington.

Does anyone living in our well-nourished country, eating a reasonable diet, really need to take vitamins, minerals, or herbs? Should a person with diabetes take them? If so, which ones and how much? When it comes to supplements, the answers are often unclear.

We do know the recommended daily allowances (RDA) for common vitamins and minerals: The RDA is defined as the amount needed to prevent deficiency diseases in about 98% of healthy individuals. Without this daily dose of vitamins, people develop such antique ailments as scurvy, rickets, beriberi, and pellagra.

Pellagra, for example, used to be common in corn-eating cultures like the southern United States prior to the mid-1900s. Because pellagra patients were photosensitive, they avoided the sun until they died a few years later. (Some medical historians believe that the disease gave rise to vampire legends because the victims went outside only at night.) In the early 1900s, it was proven that pellagra could be treated and prevented by vitamin B3 (niacin). We now know that the RDA of 14-16 mg per day will protect us from this deadly scourge.

It is also true that niacin, when used in higher doses, can affect cholesterol levels and may even impact glucose control. Unfortunately, we don't know much about the middle ground of vitamin dosages, between too little (deficiency diseases) and too much (vitamin toxicity). Non-vitamin and herbal supplements are also mostly uncharted territory. The federal government is helping a bit by funding an arm of the National Institutes of Health for Alternative Medicine, which finances some studies evaluating supplements. But because many of these compounds and herbs can't readily be patented, the financial incentive for private industry to study them is simply not present.

Generally speaking, the nutrient recommendations for people with diabetes are the same as for those without diabetes. On the other hand, diabetes, particularly if uncontrolled, is associated with micronutrient deficiencies. When sugars are high, urination is increased to wash out the extra sugar, and vitamins are washed out as well. So perhaps people with diabetes should be a bit more aggressive in their decision to use supplements.

When deciding what to take, if anything, in the arena of supplements, consider the following tips.

Tips on Taking Supplements

Don't rely on the fact that someone you know has been using a certain treatment for years. Remember Dr. James Craig, who correctly diagnosed George Washington with a throat infection and then began a series of blood-letting treatments. At the time, blood-letting was a well-regarded treatment that had been used for centuries. Unfortunately, the ex-president soon expired, probably from being bled to death.

Don't fall for this one: It's natural so it must be okay. Strychnine, botulinum toxin, hemlock, deadly nightshade, elemental lead, elemental mercury are all natural and all deadly. Although most of today's medications have molecular structures that are based on natural sources (plant-, mold-, or animal-derived), natural or herbal does not mean safe.

Watch out for off-brands of multi-vitamins. A recent study of vitamin E supplements found that a few of the brands contained less than ten percent of the stated amount. In addition to containing the stated amount, the supplement must be in a tablet, capsule, or effervescent form that will dissolve and can be absorbed from the small intestine into the blood stream. Choose a reputable brand such as GNC, TwinLab, Nature Made, and others. Look for something that contains 100% of the recommended daily allowance (RDA) for most of its constituents. Use that daily multiple vitamin to support a well-rounded and nutritious diet.

If you are going to start taking a new vitamin or supplement, be very skeptical of what you read on the Internet: Consider the source. Definitely talk to your doctor and your pharmacist. If your doctor or pharmacist thinks that all supplements are bunk, find a new doctor or pharmacist. Many vitamin and nutritional supplements are effective for various maladies, and many can be toxic or even cause drug interactions. You should be taken seriously, and supplements need to be taken seriously.

Be very careful with any substance (for example, cinnamon or niacin) that may affect your glycemic control.

Don't substitute a vitamin or any form of supplement for a healthy lifestyle or for your prescription medication.

Remain vigilant. New research is reported virtually every day, and what we think is appropriate or effective today may be proven to be otherwise tomorrow.

And now for some specifics about supplements that may have applicability to diabetes. The following are some of the more popular, and perhaps more useful, supplements.

Vitamin C

Absolute vitamin C deficiency causes the disease scurvy, which is virtually unheard of outside of third-world countries. However, relative deficiency conditions exist more commonly. Several studies have demonstrated low levels of vitamin C in people with diabetes. Vitamin C may have a positive impact on the maintenance of normal blood pressure. It is also an anti-oxidant and may have an impact on peripheral nerve function (reducing the progression of neuropathy).

While no long-term studies have been done to assess the impact of Vitamin C on peripheral neuropathy, one study from John Cunningham's group at the University of Massachusetts in Amherst found that vitamin C supplementation of 250 or 500 mg per day blocked an enzyme (aldose-reductase) that has been implicated as one possible cause of peripheral neuropathy in patients with diabetes.

Vitamin C also caused a significant reduction in the concentration (back to normal) of sorbitol, which is promoted by the above-mentioned enzyme. Sorbitol has been linked to neuropathy. The researchers concluded that Vitamin C is an effective aldose-reductase inhibitor.

Pharmaceutical companies have spent millions of dollars seeking an effective and safe aldose-reductase inhibitor for the prevention or treatment of diabetic neuropathy. Several medications have been studied in people with diabetes, but none has yet proven safe and effective. Vitamin C may fit that bill. However, long-term studies to assess the impact of vitamin C on peripheral neuropathy have not been done.

High doses of vitamin C, greater than 4000 mg daily, may cause detrimental changes in glycemic control in patients with type 2 diabetes. A reasonable and safe dose is probably 250-1000 mg per day. The potential risk and cost of taking this amount of vitamin C is negligible, and benefits, while not conclusively proven, are possible.

Dietary sources of vitamin C are citrus fruit, green and red peppers, tomatoes, spinach, and collard greens.

Vitamin E

Vitamin E is a fat-soluble vitamin known to be a potent anti-oxidant. Vitamin E is actually a term applied to a group of eight compounds, all of which are synthesized by plants. The most potent constituent of the eight is d-alpha tocopherol. While in theory it would appear that high dose vitamin E should be useful, the reality is more complex.

A couple of early small studies suggested that vitamin E might prevent some of the long-term cardiovascular risk associated with diabetes. However, several larger, well-controlled trials (HOPE, MICRO-HOPE, and the Primary Prevention Project) each concluded that vitamin E supplementation had no measurable effect on cardiovascular or small vessel (kidney disease) disease in people with diabetes.

Still, many people decide to take the vitamin for other potential benefits. Daily doses of between 15 and 800 mg or IU (International Units) per day of alpha-tocopherol are probably reasonable. Vitamin E supplementation should be avoided in people treated with Coumadin or aspirin therapy, prior to consultation with their provider.

In foods, Vitamin E can be found in spinach, green peas, sweet potatoes, sunflower seeds, bean sprouts, black-eyed peas, almonds, peanuts, and cashews.

Alpha-Lipoic Acid

Alpha-lipoic acid or lipoic acid (LA) is a very potent anti-oxidant compound and is also a cofactor in several important biologic reactions. In Germany, it has been used for years to treat acute painful diabetic neuropathy. It has been evaluated in several well-controlled studies carried out in Germany, Russia, and the United States in patients with diabetes. In these trials (DEKAN Study, and The SYDNEY trial), LA was associated with improvement in autonomic and painful peripheral neuropathy.

Other studies have suggested that LA may improve glucose utilization in some patients with type 2 diabetes and may slow the progression of kidney damage. LA has not been associated with toxicity in doses used in these studies, typically 600 mg once or twice daily.

No dietary sources of alpha-lipoic acid are known.

Chromium Picolinate

Chromium is an essential element that is involved in the action of insulin. Severe chromium deficiency is rare. However, when compared with healthy non-diabetic people, individuals with diabetes, especially those with cardiovascular disease, have lower chromium levels. A couple of studies have found that low chromium concentrations in toenails (a measure of long-term intake) predict a higher incidence of heart attacks in otherwise healthy people.

Over ten small studies have evaluated the effects of chromium picolinate on glucose metabolism and blood fats in people with diabetes or impaired glucose tolerance, and in people without diabetes. In most of these studies, an increase in HDL (healthy cholesterol), an increase in the effectiveness of insulin, a reduction in triglyceride fats, and a reduction of glucose were observed. Doses of up to 1000 micrograms per day for as long as 64 months have reported no toxic effects.

Most of the studies evaluated 200 to 600 micrograms per day. A reasonable supplemental dose is probably 400 micrograms per day. Antacids or calcium carbonate can reduce the absorption of chromium and therefore should be taken at different times during the day. Talk with your physician and pharmacist prior to taking chromium picolinate, as you could potentially experience hypoglycemia and require a dose adjustment of your diabetes medications.

Dietary sources of chromium picolinate are whole grains, green beans, broccoli, processed meats, and bran cereals.

Cinnamon

Cinnamon made the news in 2003 with the publication of a study in the journal Diabetes Care. The study reported that cinnamon supplementation (1, 3, or 6 gms per day) was associated with a reduction in fasting glucose (18-29%), triglycerides (23-30%), and LDL cholesterol (7-27%) in patients with type 2 diabetes. Since then, two other studies have been published which reported no significant changes in fasting plasma glucose or A1c s (glycosylated hemoglobin) with cinnamon administration.

Fewer than one hundred patients received cinnamon in all three studies combined, the studies were relatively short, and it is difficult to standardize cinnamon, all of which make it difficult to draw conclusions. If you do decide to try cinnamon, you certainly need to discuss it with your provider because if cinnamon does reduce blood sugar, you might have hypoglycemic episodes. A reasonable dose would probably be 1.5 to 2 grams per day; however, I would suggest not taking this until more is known about it.

Gamma-Linolenic Acid

Gamma linolenic acid (GLA) is a naturally occurring omega-6 fatty acid harvested from the seeds of evening primrose or borage. Several small studies in patients with type 1 or type 2 diabetes reported improvement in neuropathy with the administration of GLA. However, GLA may affect clotting. Therefore, it should only be used under the supervision of your provider if you take any other medication that can affect bleeding times, such as aspirin, Coumadin, non-steroidal anti-inflammatory drugs, or others. Also, GLA can increase seizure risk in patients taking Thorazine, Stelazine or other phenothiazine drugs (used to control mental disorders). Doses used in the trials evaluating the effects of GLA on neuropathy were between 350 and 500 mg per day.

No dietary source of gamma-linolenic acid is known.

Magnesium

Magnesium is an essential trace mineral that is needed for over 300 biochemical reactions in the human body, including cellular energy production, the synthesis of genetic material (DNA and RNA), and the production of important proteins. Magnesium is important for nerve conduction, muscle contraction (including the heart), and the maintenance of appropriate tone of blood vessels.

Most of the magnesium in your body resides inside cells, so by the time that a routine blood test (which measures magnesium that is outside of cells) shows low magnesium levels, your body is quite depleted. Low magnesium is common in people with diabetes (25-38%). Magnesium deficiency may result in an inability to utilize insulin properly.

Several studies have evaluated the effects of magnesium on glucose levels in people with diabetes. The results of these studies are mixed, but generally when an effect was observed (which often was not the case), it was minimal. Magnesium supplementation may offer some protection for the heart, kidney, and nerves, but good studies are lacking. Magnesium toxicity is very rare except in people with kidney failure. Supplementation should not exceed 350 mg per day of elemental magnesium.

Dietary sources of magnesium are unprocessed grains, nuts, legumes, seafood, and chocolate (which is also high in sugar and fat).

Omega-3 Fatty Acids

(Fish oils and flaxseed oils)

Omega-3 fatty acids have been shown to reduce triglycerides, especially in people with high triglyceride levels. They also appear to have beneficial effects on the prevention of problems due to atherosclerosis (heart attacks, sudden death, and overall death). Several studies have also suggested a link between omega-3 fatty acid consumption and a reduction in rates of depression. It does not appear to matter if the omega-3 fatty acids are taken as a supplement or obtained via the consumption of fish.

The potential downside is that omega-3 fatty acids may cause a slight increase in bad cholesterol (LDL), so if you are going to use this supplement, make sure your provider monitors your cholesterol. Three to five grams of fish oil should be taken daily.

Omega-3 fatty acids are found in swordfish, flounder, herring, shark, halibut, salmon, tuna, cod, and others.

Pycnogenol

Pycnogenol is the US registered trademark for an extract from *Pinus Pinaster* (Maritime Pine Bark). This extract contains a group of bioflavonoids called procyanidins. Pycnogenol is a potent anti-oxidant, but probably has several mechanisms of action.

Pycnogenol has been shown to slow or prevent continued deterioration of retinal function in patients with diabetic retinopathy. It may also cause a slight reduction in systolic blood pressure. A study in the autumn of 2006 demonstrated an improvement in the functioning of small blood vessels in patients with diabetes: Capillary function was statistically significantly better in those taking Pycnogenol versus placebo over a period of four months. One study showed a slight improvement in erectile function after three months of treatment with Pycnogenol.

Long-term safety (greater than four months) has not been studied, but to date no adverse reactions have been reported. Suggested dose is 50 mg, three times daily.

Sources of Pycnogenol other than French maritime pine bark, are peanut skins, grape seed, and witch hazel bark.

Selenium

Several trials have now suggested a link between high serum selenium levels and diabetes. A study published earlier this year in the journal *Diabetes Care*, from the Welsh Center for Prevention, Epidemiology, and Clinical Research and Johns Hopkins University in Baltimore, reported that high serum levels of selenium were positively associated with prevalence of diabetes. This study came three years after researchers at Cornell reported a link between high amounts of a selenium-containing enzyme and the development of a type 2-like syndrome in mice. Supplementation with selenium is not recommended at this time in non-selenium-deficient individuals.

Vanadium

Vanadium is characterized as a nonessential nutrient or a substance that is required in only miniscule amounts. No physiologic function has been described and no deficiency states have been identified in humans. There is no recommended daily allowance for vanadium. Vanadium exists in a couple of forms available as a supplement: vanadyl sulfate and vanadyl metavanadate. While a few small studies have suggested that vanadium supplementation may be associated with slightly better glycemic control and improved insulin sensitivity, no well-designed randomized controlled trials have been completed. There is too little data to recommend the use of vanadium at this time.

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