



ALPHA-LIPOIC ACID

Antioxidant protection

Antioxidants. Study upon study shows they may be preventive and therapeutic for numerous health problems, from diabetes and cancer to failing eyesight and the onset of wrinkles. If you could design a perfect antioxidant, what would it be like? Probably it would be as good as or better than vitamins E and C, the antioxidant vitamin heavyweights. It might be both fat- and water-soluble, work inside and outside of cells, recharge other antioxidants already present to give them more quenching power, and above all, be perfectly safe. Alpha-lipoic acid is on the “best antioxidant list” and does all of those things, coming close to being the “perfect” antioxidant.

Scientists have known about alpha-lipoic acid, a vitamin-like substance, since the 1930's when it was isolated from potatoes. Called “the potato growth factor,” scientists changed the name to alpha-lipoic acid when they discovered that it was an essential coenzyme involved in energy production. It was not until 1988 that researchers saw its potential as an antioxidant.

WHY UNIQUE

We encounter free radicals every day, with every breath we take. Scientists estimate that the DNA in each cell takes about 10,000 free radical “hits” per day – potential for a lot of cell damage. Exposure to cigarette smoke, polluted air, car exhaust, alcohol, even sunshine, increases the oxidative stress on our cells and it shows. Free radical damage is implicated in wrinkles, cataracts, even heart disease and cancer. So it makes good sense to increase our antioxidant protection wherever we can.

Alpha-lipoic acid has a number of things going for it: it is a very small molecule, efficiently absorbed, and easily crosses cell membranes. Unlike vitamin E which is primarily fat-soluble and vitamin C which is water-soluble, alpha-lipoic acid is at home in both aqueous and lipid environments, where it can quench free radicals both inside the cell and outside in the intracellular spaces. Inside the cell alpha-lipoic acid is converted to dihydrolipoic acid, an even stronger antioxidant. Both alpha-lipoic acid and dihydrolipoic acid are good at stopping particularly nasty radicals before they can do much harm.

RECYCLES OTHER ANTIOXIDANTS

When antioxidants give up their electrons to quench a free radical, they die. Unless, of course, something comes along that recharges them. Alpha-lipoic acid extends the bio-

chemical life of other antioxidants by restoring their missing electrons, allowing them to continue to be effective. Vitamins C and glutathione are directly recycled by alpha-lipoic acid, while vitamin E is indirectly recycled.

IT CREATES ENERGY

Alpha-lipoic acid helps to convert the food we eat into energy. Much of this action goes on in the mitochondria of the cells. It is also essential to blood sugar control, hastening the body's breakdown of sugar. With a key role in several important enzyme systems, alpha-lipoic acid has therapeutic potential in conditions such as diabetes, where the body cannot properly metabolize food into energy.

BLOOD SUGAR CONTROL

Alpha-lipoic acid is used in Europe to treat peripheral neuropathy and cataracts, complications of diabetes. “Alpha-lipoic acid improves nerve blood flow, reduces oxidative stress, and improves distal nerve conduction in experimental diabetic neuropathy... Lipoic acid did not affect the nerve blood flow of normal nerves but improved that of diabetic neuropathy in a dose-dependent manner.” (Ley) The antioxidant ability of alpha-lipoic acid may be responsible for the improvement. “However, studies show it also leads to an improvement in blood sugar metabolism, reduces glycosylation of proteins, improves blood flow to the peripheral nerves, and actually stimulates the regeneration of nerve fibers.” (Murray)

When 80 diabetics were given either 600 mg of alpha-lipoic acid, 100 micrograms of selenium or 1,200 IU of natural-source vitamin E for three months, symptoms of neuropathy improved significantly with all three antioxidants, but not in the control group. (Kahler, *et al.*) The study reaffirms that oxidative stress causes many of the complications of diabetes.

As alpha-lipoic acid may affect how much insulin is required, diabetics should closely monitor their blood sugar levels if they take it.

ANTICANCER?

Well-established research confirms that the occurrence of cancer increases when antioxidants are low. Antioxidants keep free radicals in check before they can impair the immune system or damage cell DNA. Richard Passwater explains why alpha-lipoic acid may be useful. “Oncogenes

are genes that cause cancer. Oncogenes normally play a role in the growth and proliferation of cells, but when they are altered in some way such as by the activated NF kappa-B or a carcinogen, they cause the cell to become malignant. Dietary lipoic acid can enter the cytosol of cells and protect NF kappa-B from activation by radiation, free radicals or even sunlight." (Passwater)

OTHER CONDITIONS MAY BENEFIT FROM ALPHA-LIPOIC ACID

Alpha-lipoic acid is such a versatile antioxidant that it may prove useful in any number of conditions caused by free radical damage. In animal studies alpha-lipoic acid supplementation improved the long-term memory of aged mice. (Stoll, *et al.*) Experiments in newborn rats showed that alpha-lipoic acid prevented cataract formation. (Maitra, *et al.*)

WE MAKE ALPHA-LIPOIC ACID, SO WHY SUPPLEMENT?

Although we make alpha-lipoic acid, our body is quite stingy in its manufacture, with little left over for antioxidant protection. "There is no doubt at all, however, that the body does synthesize alpha-lipoic acid. There is a lot of evidence that the synthesized alpha-lipoic acid is only adequate for the metabolic function, and that additional alpha-lipoic acid that is needed for the antioxidant function comes from dietary sources including supplements." (Passwater)

DOSAGE

The dosage range of alpha-lipoic acid is 200 to 600 milligrams per day. For more serious ailments, it is preferable to check with a knowledgeable health care practitioner for correct dosage and monitoring.

SAFETY

Alpha-lipoic acid has been used for three decades to treat diabetic neuropathy, at dosages from 300 to 600 milligrams daily, with no adverse effects. Diabetics who choose to take it should be under a health care practitioner's care to monitor blood glucose levels, as it may reduce the need for insulin or medication. Although

alpha-lipoic acid has no carcinogenic or teratogenic effects, it is not recommended for pregnant women at this time.

ANTIOXIDANTS – MORE IMPORTANT THAN EVER

Study after study shows that antioxidants are key to protecting us from the onset of degenerative diseases and the ravages of aging. Alpha-lipoic acid, the "near perfect" antioxidant may yet prove to be one of the most powerful allies in our antioxidant defense system.

KEY REFERENCES

- Kahler W., *et al.*, "Diabetes mellitus – a free radical-associated disease: Results of adjuvant antioxidant supplementation," *Gesamte Inn Med*, 48:223-232; 1993
- Ley B.M., "Alpha-lipoic Acid," *Townsend Letter for Doctors and Patients*; November 1996
- Maitra I., *et al.*, "Alpha-lipoic acid prevents buthionine sulfoximine-induced cataract formation in newborn rats," *Free Radical Biology & Medicine*, 18: 823-829; 1995
- Murray M.T., "Encyclopedia of Nutritional Supplements," *Prima Publishing*; 1995
- Passwater, R.A., Ph.D. "Lipoic Acid: the Metabolic Antioxidant," *Keats Publishing*; 1995
- Passwater, R.A., Ph.D., "Lipoic Acid Basics: an interview with Dr Jim Clark," *Whole Foods*, January, vol 19 no 1; 1996
- Stoll S., *et al.*, "The potent free radical scavenger alpha-lipoic acid improves memory in aged mice: putative relationship to NMDA receptor deficits," *Pharmacology, Biochemistry & Behavior*, 46: 799-805; 1993