

Alpha-Lipoic Acid

Alpha-lipoic acid (ALA), an essential cofactor of alpha-oxoacid dehydrogenase complexes, is a highly effective antioxidant that quenches a number of free radicals in both lipid and aqueous domains. ALA also has metal-chelating activity, acts synergistically with other antioxidants, and may have an effect on regulatory proteins and on genes that are involved in normal growth and metabolism^{1,2,3}.

ALA shows promise for treating those with Alzheimer's disease (AD) and related dementias. A recent small clinical trial (n = 9) showed that daily administration of 600 mg of ALA over the long term (337 ± 80 days) to patients with AD demonstrated stabilized cognitive functions⁴.

In addition, ALA has been widely studied in experimental designs for use in hepatology. Animal models show promise for the use of ALA administration in conditions of liver poisoning (e.g., alcohol, carbon tetrachloride, arsenic, and radiation)³. Recent human trials using ALA interventions for mushroom poisoning in Germany and for radiation injury following the Chernobyl accident have also shown promise³. Given the fatal nature of such poisonings, however, randomized clinical trials are unlikely.

ALA has shown the most proven effectiveness in the prevention and treatment of non-insulin dependent (type 2) diabetes mellitus (NIDDM). It is well understood that the decline in insulin-mediated glucose uptake that is observed in NIDDM is due to oxidative stress, which is, in turn, associated with reduced glucose transporter exposure and/or impairment of insulin signaling^{5,6}.

Several placebo-controlled explorative studies using patients with NIDDM have shown that oral administration of ALA significantly increases insulin-mediated

glucose uptake, most probably by modulating insulin sensitivity⁷. In a placebo-controlled pilot trial of 74 patients with NIDDM, the ALA-treated group demonstrated +27% insulin-stimulated glucose disposal than the placebo group⁸. ALA also significantly improves the imbalance between increased oxidative stress and depleted antioxidant defense even in patients with poor glycemic control and albuminuria⁹.

Both short-term and longer trials have also shown a beneficial impact of ALA administration, both intravenous and oral, on diabetic neuropathy^{10,11,12}. It is a powerful free-radical scavenger in peripheral nerves and promotes fiber regeneration and stimulates nerve growth factor⁶.

In both human and animal trials, ALA has also shown promise in the treatment of a number of health conditions caused by or exacerbated by oxidative stress. Among these are ischemia-reperfusion injury, cataract formation, HIV activation, neurodegeneration, and radiation injury¹.

ALA also acts synergistically with other antioxidants, including vitamins C, E, coenzyme Q10, and glutathione. Research has shown that both ALA and its reduced form dihydrolipoic acid ([DHLA] into which it is rapidly converted after entering cellular metabolism) can recycle these antioxidants from the inactive oxidized state to the functional reduced state, thus extending their useful life in the body^{1,13}.

Orally administered ALA appears to have the same bioavailability as other administration methods¹⁴, and no serious side effects have been found in either human or animal studies although minor allergic skin reactions have been encountered¹. ALA is approved in Germany for the treatment of diabetic polyneuropathy^{1,3}.

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