

ALPHA LIPOIC ACID

We are about to give you so much information about Alpha Lipoic Acid it will make your head spin. We strongly suggest that you read every word of what follows. We are going to give you literally dozens of beneficial metabolic effects from lipoic acid, any one of which is in itself enough reason to supplement with it.

IT IS ALMOST INCOMPREHENSIBLE THAT ALL THESE BENEFITS CAN COME FROM ONE ADAPTOGENIC NUTRIENT.

- Alpha lipoic acid is a di-thiol antioxidant. It is reduced to the thiol form intracellularly. The di-thiol (two sulfur) character of its molecular structure is what gives it its anti-anabolic, anti-reductive stress activity in your Diphasic A.M. Because of its metabolically active sulfur, it has antioxidant activity as part of the glutathione system of antioxidants, as well as in the glutathione derivatives cysteine and n-acetyl-cysteine.
- Lipoic acid not only restores glutathione and glutathione peroxidase as part of your body's anti-anabolic antioxidant defense system, but is also an important part of your anti-catabolic anti-oxidant system. This anti-oxidant function is shown in the research as an amazing effect at decreasing malondialdehyde, one of the principal end products of age-related lipid peroxidation. Lipoic acid also potentiates the antioxidant enzyme systems super oxide dismutase and catalase, and glutathione reductase.
- It particularly decreases iron-dependent lipid peroxidation.
- Lipoic acid has anti-aging effects by attenuating the decrease in both enzymatic (e.g., SOD) and non-enzymatic (e.g., vitamin E) antioxidant levels with age.
- One interesting study compared the antioxidant effects of lipoic acid with those of alpha tocopherol (Vitamin E.) The results? Lipoic acid effectively decreased LDL cholesterol oxidative susceptibility associated with atherosclerosis (but not quite as well as alpha tocopherol). Lipoic acid decreased urine FZ-isoprostanes (but not quite as well as alpha tocopherol). Lipoic acid decreased plasma protein carbonyl levels (which are a key marker for aging processes) (while alpha tocopherol had no effect whatsoever.)
- Lipoic acid has been shown to decrease oxidative stress associated with lead poisoning.

- Oxidation of hemoglobin is prevented by both lipoic acid and vitamin E (but not by vitamin C).
- Some of the most highly toxic products of lipid peroxidation inhibit mitochondrial respiration by inhibiting alpha ketoglucarate dehydrogenase and pyruvate dehydrogenase. This toxic inhibition is associated with decreased enzyme activity, which is induced by insufficient availability of lipoic acid sulfhydryl groups.
- Lipoic acid is an anti-oxidant in both fat and water soluble media, and is active both intra- and extra-cellularly.
- Lipoic acid increases intra cellular Co-enzyme Q-10, and regenerates both vitamin C and vitamin E intracellularly.
- Lipoic acid is a hydroxyl radical quencher (due to the di-sulfate bond in the di-thiol ring).
- Lipoic acid (and sodium iodide) increases cyclo-oxygenase, which increases the oxidation of arachidonic acid, and increases the reduction of Prostaglandin PGG2 to Prostaglandin PGH2, which decreases inflammation of all types.
- Lipoic acid prevents oxidative stress in the liver, the heart, and in the gastrocnemius muscle in response to exercise.
- Lipoic acid increases energy availability to the brain and to muscles during exercise.
- Lipoic acid has been shown to improve cardiac autonomic neuropathy, which is diagnosed by reduced heart rate variability (a Sympathetic Imbalance indicator) at rest. (Tie this in with your NUTRI-SPEC clinostatic pulse response.)
- Lipoic acid, prevents atherosclerosis, and particularly lowers triglycerides.
- Endothelial migration of monocytes is one of the first steps in atherosclerosis, along with the action of vascular adhesion molecules. These two fundamentals of atherosclerosis are stimulated by glycation end products, and are reversed by lipoic acid. (We have discussed the oxidative damage associated with glycation in many NUTRI-SPEC Letters.)
- Lipoic acid given to patients with coronary artery disease and essential hypertension has been shown to have a favorable influence on the fatty acid content of the blood.

- Lipoic acid has been shown in clinical studies to decrease elevated triglycerides by as much as 45%. (Elevated triglycerides (and not elevated cholesterol) is one of the few true risk factors for heart attacks and strokes.)
- As decreasing elevated triglycerides is one of your most important clinical goals, you must give your patients lipoic acid. Nothing compares with lipoic acid as a means to lower triglycerides, and it does so by several mechanisms. When you combine the lipoic acid in your Diphasic A.M. and Diphasic P.M. with your NUTRI-SPEC Fundamental Diet (avoidance of excess carbohydrate in general, and fructose in particular), you will offer your patients by far the most effective way to lower deadly triglycerides. There have been many, many instances of NUTRI-SPEC practitioners lowering patients' triglycerides by more than 1000 in a period of less than 6 months. You can do so as well. Doing so is as simple as either beginning to do NUTRI-SPEC testing on all your patients, or, implementing the Diphasic Nutrition Plan for your patients (and, of course, giving up all your favorite herbal remedies, "adrenal support" supplements, and mega doses of this and that).
- In spontaneously hypertensive rats, excess endogenous aldehydes (resulting from oxidative stress) bind sulfhydryl groups of membrane proteins, altering membrane calcium channels and increasing blood pressure. Lipoic acid binds these excess aldehydes and actually decreases elevated blood pressure. Lipoic acid particularly decreases elevated systolic blood pressure, decreases excess cellular calcium, decreases elevated serum glucose and decreases elevated serum insulin, and decreases tissue aldehyde conjugates that are associated with tissue catabolism and premature aging. Lipoic acid also decreases adverse renal vascular changes associated with hypertension.
- Lipoic acid is also known as "acetate replacing factor," and as "pyruvate oxidation factor." As such, it is an important part of efficient oxidative energy production in the body.
- Lipoic acid is a co-factor of mitochondrial dehydrogenase complexes. It activates lipid kinase, tyrosine kinase, and serine/threonine kinases, which increase the efficiency of glucose uptake for normal oxidative energy production.
- Lipoic acid is a di-sulfate co-factor of dehydrogenases in oxidative phosphorylation.
- Lipoic acid is an alpha keto-acid dehydrogenation co-enzyme. It is thus the link between lipid and carbohydrate metabolism. Lipoic acid can also be considered the universal co-enzyme of alpha keto-acid oxidation.

- Lipoic acid decreases the lactate to pyruvate ratio in cells (--- a critical benefit for your Anaerobic patients), and decreases lactic acid acidemia.
- Lipoic acid is an essential mitochondrial co-enzyme. It increases oxygen consumption, increases metabolic activity, and increases mitochondrial membrane potential in hepatocytes of aged rats.
- Associated with this role as a metabolic activator, it is effective in the treatment of liver disease.
- Lipoic acid decreases nitric oxide synthesis (which is associated with septic or endotoxic shock) in the liver by improving carbohydrate metabolism in hepatocytes. [It is interesting to note that while lipoic acid decreases the damage from nitric oxide, administration of glutathione or N-acetyl cysteine by themselves actually can increase the damage from nitric oxide.]
- Lipoic acid reverses the age-related decrease in hepatocyte glutathione and ascorbic acid.
- One study showed that lipoic acid combined with selenium decreased Hepatitis C, decreased cirrhosis, decreased portal hypertension and decreased esophageal varices.
- Lipoic acid is a hydroxyl radical quencher (due to the di-sulfate bond in the di-thiol ring).
- Lipoic acid has been shown to decrease cataracts.
- Lipoic acid has been shown to decrease the tendency to calcium oxalate kidney stones.
- Lipoic acid increases T-Cell function in cancer patients.
- Lipoic acid is an essential constituent of biological membranes. Another study shows that membrane fluidity and protein sulfhydryl reactivity of RBCs is decreased in diabetes, and is increased by lipoic acid supplementation.
- In its antioxidant role, lipoic acid has been shown to decrease diabetic neuropathy.
- A note on diabetic neuropathy: Studies have shown that in diabetic neuropathy the nerve is ischemic and hypoxic, with increased dependence on anaerobic metabolism. Lipoic acid increases glucose uptake and efficient oxidative metabolism and thus benefits the diabetic neuropathy.

- Type II diabetics have increased fasting lactate and pyruvate concentrations in their blood. Furthermore, the increased lactate and pyruvate concentrations double after glucose loading in obese patients, but not in lean patients. Lipoic acid was shown to decrease excessive lactate and pyruvate levels in the serum of Type II diabetics. (These are generally your Ketogenic Imbalance patients.)
- Lipoic acid has been shown to decrease age-related memory loss.
- NMDA receptors in the brain are modulated by endogenous redox agents such as glutathione, lipoic acid, and PQQ.
- Parkinson's Disease, ALS, Huntington's Disease, Friedreich's ataxia, and mitochondrial cytopathies and other neuromuscular diseases share to some extent the final common pathway leading to cell death through either necrosis or apoptosis. Compounds such as creatine monohydrate, and CoQ10 offer substantial neuroprotection against ischemia, trauma, oxidative damage, and neurotoxins. Miscellaneous agents, including alpha lipoic acid, beta-hydroxy beta-methylbutyrate, riboflavin, and nicotinamide, have also been shown to improve various metabolic parameters in brain and/or muscle.
- Lipoic acid is considered a universal antioxidant because it is an amphipathic substance. Lipoic acid and its reduced form, dihydrolipoic acid, act against ROS, reducing oxidative stress. Therefore, this antioxidant has been used in the treatment of many diseases, including a new perspective for the treatment of Parkinson's Disease (PD).
- Coadministration of lipoic acid, a thiol antioxidant, abolished the toxic effects of a single dose of MPTP. Lipoic acid also attenuated dopaminergic cell loss seen after subchronic MPTP treatment. MPTP triggers death signaling pathway in vivo, and thiol antioxidants such as lipoic acid terminate this cascade and afford neuroprotection.
- An important biochemical feature of PD is a significant early depletion of the thiol antioxidant glutathione, which may lead to the degeneration of ROS, mitochondrial dysfunction, and ultimately to subsequent neuronal cell death. Pretreatment of PC12 cells with lipoic acid acts to prevent depletion of glutathione content and preserves the mitochondrial complex 1 activity which normally is impaired as a consequence of glutathione loss in PD.
- Lipoic acid and acetyl-l-carnitine are 2 mitochondrial antioxidants studied in a chronic rotenone-induced cellular model of PD. Both nutrients were found to be protective against mitochondrial dysfunction, oxidative damage, and accumulation of alpha-synuclein and ubiquitin. Most notably, it was found that combined lipoic acid and acetyl-l-carnitine worked at 100 to

1,000 times fold lower concentrations than they did individually.

Pretreatment with combined lipoic acid and acetyl-l-carnitine increased mitochondrial biogenesis and decreased production of ROS through the upregulation of peroxisome proliferator-activated receptor-gamma coactivator 1 alpha as a possible underlying mechanism. This study provided important evidence that combining mitochondrial antioxidants at optimal doses might be an effective and safe prevention strategy for PD.

- Another qualitative consideration concerns the lipoic acid that you see as an ingredient in both your Diphasic A.M. and Diphasic P.M. products. Alpha lipoic acid is available as a nutrient in both water soluble and fat soluble forms. Both forms are truly amazing in their biological effect, yet there are certain aspects of the effects of alpha lipoic acid which derive primarily from the fat soluble form. With your Diphasic Nutrition Plan you are getting alpha lipoic acid in both the water soluble (Diphasic A.M.) and in fat soluble (Diphasic P.M.) forms. Probably at least 90% of the alpha lipoic products available to you are in the water soluble form only. Only with NUTRI-SPEC can you be sure to be getting all the beneficial effects of alpha lipoic acid.