

Alpha Lipoic Acid & Stabilized R-Lipoic Acid

Doctor's BEST
Science-Based Nutrition™



Ingredients

Alpha-lipoic acid is a sulfur-containing fatty acid that performs vitamin-like roles in the body. Also known as lipoic acid (LA) or thioctic acid, it functions as a co-enzyme in the metabolism of carbohydrates, and is in this way similar to B-complex vitamins. LA is required for synthesis of acetyl CoA, a key metabolite in the cellular process that turns glucose (blood sugar) into energy. Because the body produces LA on its own, it is not classified as a true vitamin. As with other so-called “non-essential” nutrients, however, internal LA production may not always be optimal.

Alpha-lipoic acid functions as both a water-soluble and fat-soluble antioxidant. Free radicals are normal by-products of metabolism that, while necessary at normal levels, may damage tissues over time if not properly kept in check by antioxidants. Lipoic acid's ability to neutralize free radicals in both watery and fatty environments makes it a highly versatile antioxidant. In the body, alpha-lipoic acid can be converted (reduced) to DHLA, or dihydrolipoic acid, a potent mitochondrial antioxidant. It is not necessary to take DHLA as a supplement, as the body may readily convert LA to DHLA.

What is BioEnhanced® Na-RLA Stabilized R-Lipoic Acid?

Alpha-lipoic acid comes in two forms, designated as “R-lipoic acid” and “S-lipoic acid.” R- and S- lipoic acid are enantiomer isomers--molecules that appear as mirror images of each other. R-lipoic acid is naturally synthesized by humans, animals, and plants. S-lipoic acid is formed during chemical synthesis of alpha-lipoic acid, producing a “racemic” mixture of the two enantiomers that is often used in clinical studies on alpha-lipoic acid. Pharmacokinetic studies have shown that R-lipoic acid is more bio-available than the S- form.¹ For example, following single oral doses of 50 to 600 mg of racemic LA, maximum serum levels of the R- form were 40 to 50% higher than the S- lipoic form.²

Doctor's Best Stabilized R-Lipoic Acid contains BioEnhanced® Na-RLA, the sodium salt of R-Lipoic acid (RLA). Pure RLA is a very unstable molecule that has a tendency to polymerize with exposure to heat, light, and moisture. This presents problems for those wishing to supplement with RLA, since any of these conditions can lead to deactivation of the beneficial activity of alpha-lipoic acid. Unlike pure RLA, BioEnhanced® Na-RLA is a stabilized form of RLA that won't degrade at high temperatures. By taking

Alpha Lipoic Acid 150mg, 120C

Supplement Facts

Serving Size 1 veggie capsule
Servings per container 120 servings

	Amount per serving	% Daily Value
Alpha Lipoic Acid	150 mg	†

† Daily Value not established.

Other Ingredients: Modified cellulose (vegetarian capsule), microcrystalline cellulose, magnesium stearate (vegetable source).

Suggested Adult Use: Take 1 capsule daily, with or without food, or as recommended by a nutritionally-informed physician.

Non-GMO / Gluten Free / Soy Free / Vegan
Store in a cool dry place

Alpha Lipoic Acid 300mg, 180VC

Supplement Facts

Serving Size 1 veggie capsule
Servings per container 180 servings

	Amount per serving	% Daily Value
Alpha lipoic acid	300 mg	†

† Daily Value not established.

Other Ingredients: Modified cellulose (vegetarian capsule), microcrystalline cellulose, silicon dioxide, magnesium stearate (vegetable source).

Suggested Adult Use: Take 1 capsule daily with or without food, or as recommended by a nutritionally-informed physician.

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the sodium salt of RLA, its solubility is increased and it has an improved dissolution in the body. It is more bioavailable than regular RLA and has no solvent residues.³

Note regarding sodium: The RLA in this product is stabilized with Na (sodium). However, one serving of this product contains less than 1% of the Daily Value for sodium, an insignificant contribution to dietary sources. Research suggests that sodium may impact blood pressure in some individuals only when it is consumed as sodium chloride (NaCl, table salt) and not in other forms. The sodium in this product is unlikely to affect blood pressure levels.

D-Biotin

Doctor's Best Stabilized R-Lipoic Acid includes optically pure D-Biotin, the natural form of biotin. D-Biotin is a water-soluble vitamin and member of the vitamin B-complex that aids in the utilization of other B-complex vitamins. Integral to many of the activities of enzymes in the human body, D-biotin is necessary for the breakdown and conversion of fatty acids and carbohydrates into energy, allowing for the production of fats and excretion of protein breakdown products. Long-term administration of lipoic acid can lower the activities of the biotin-dependent enzymes pyruvate carboxylase and beta-methylcrotonyl-CoA carboxylase by competing with biotin.⁴ Supplementing with LA may thus increase the body's requirements for this vitamin

Supports the body's defense against free radicals* Recycles antioxidant nutrients such as Vitamin C and Vitamin E*

An ideal antioxidant would have the ability to quench a wide variety of free radicals, to support the functioning of other antioxidants, to bind or "chelate" metal ions that can generate free radicals, to function in watery and fatty environments, and to be present in tissues, cells, and extracellular spaces. Having exceeded these criteria, Lipoic Acid was termed the "universal antioxidant."⁵

As a team, LA and DHLA come close to the ideal, for the following reasons:⁶⁻⁸

- 1) LA is easily absorbed when consumed orally.
- 2) LA is readily converted to DHLA in various tissues.
- 3) As a pair, LA and DHLA neutralize superoxide, hydroxyl, peroxy, and hypochlorous radicals.
- 4) LA and DHLA form stable complexes with metal ions such as iron, manganese, copper and zinc ions.
- 5) LA and DHLA scavenge free radicals in both fatty and watery environments.
- 6) DHLA recycles other important antioxidants.

Within the cell, antioxidants work as a team to keep free radicals from damaging cell structures. In order to neutralize a free radical, an antioxidant such as vitamin C must give up an electron, which means it becomes oxidized. Before it can function as an antioxidant once again, it must be regenerated back to its "reduced" form by gaining an electron to replace the donated electron. For this, it needs the help of other antioxidants. Vitamin C, vitamin E, and glutathione are key antioxidants that can be generated by cycling between their oxidized and reduced forms. This is necessary to maintain the balance between oxidation and its reverse--the neutralization of free radicals by antioxidants.

DHLA is an essential component in the interaction between these antioxidants, as well as being able to recycle coenzyme Q (CoQ). Studies show that addition of alpha-lipoic acid to liver tissues results in increased vitamin C levels. It has been found that DHLA is responsible for regenerating vitamin



Alpha Lipoic Acid 600mg, 60VC

Supplement Facts

Serving Size 1 veggie capsule
Servings per container 60 servings

	Amount per serving	% Daily Value
Alpha-lipoic acid	600 mg	†

† Daily Value not established.

Other Ingredients: Modified cellulose (vegetarian capsule), microcrystalline cellulose, magnesium silicate, silicon dioxide, magnesium stearate (vegetable source).

Suggested Adult Use: Take 1 capsule daily, preferably between meals. Higher intakes may be appropriate, as recommended by a nutritionally-informed physician.

Non-GMO / Gluten Free / Soy Free / Vegan
Store in a cool dry place.

Alpha Lipoic Acid 600mg, 180VC

Supplement Facts

Serving Size 1 capsule
Servings per container 180 servings

	Amount per serving	% Daily Value
Alpha-lipoic acid	600 mg	†

† Daily Value not established.

Other Ingredients: Modified cellulose (vegetarian capsule), silicon dioxide, microcrystalline cellulose, magnesium stearate (vegetable source), magnesium silicate.

Suggested Adult Use: Take 1 capsule daily, preferably between meals. Higher intakes may be appropriate, as recommended by a nutritionally-informed physician

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C, which in turn regenerates vitamin E.⁸ DHLA also converts glutathione from its oxidized form back into its free radical scavenging reduced form.⁸ ⁹ The LA/DHLA pair is thus vital for answering “oxidative stress,” which occurs when the balance is tipped in favor of oxidation in cells.¹⁰ DHLA helps preserve antioxidants in both the watery cell interior and the fatty structure of cell membranes.⁵ Evidence from animal studies suggests the free radical-scavenging activity of DHLA in the mammalian brain.¹¹



Helps maintain healthy glucose metabolism*

Alpha-lipoic acid is a key factor in the cellular process that metabolizes glucose for energy production. Researchers have noted that for a non-hormonal compound, LA is remarkable for its effect on carbohydrate metabolism—especially the R-lipoic form of alpha-lipoic acid. For example, *in vitro* studies have shown the ability of RLA to promote rapid uptake of glucose in muscle and fat cells.^{12,13} The impact of lipoic acid administration in promoting healthy blood sugar metabolism is also evidenced in numerous animal and human studies.^{14,15} In one rat study, the known benefit of exercise on glucose uptake was complimented by 30 mg of RLA per kg body weight for 2 weeks. Glucose uptake into muscle increased by 45% in sedentary rats given RLA (compared to rats not receiving RLA); when the rats combined treadmill exercise with the RLA administration, glucose uptake jumped to 124% (compared to only 68% in rats given exercise but no RLA).¹⁶ After helping to initially increase glucose uptake into cells, RLA subsequently increases glucose utilization via activation of an enzyme complex—called the pyruvate dehydrogenase complex—involved in energy production inside the mitochondria of cells.¹⁷ LA is cited especially for its ability to reduce oxidative stress in the context of the important relationship between healthy blood sugar levels and vascular health.¹⁸

Supports healthy aging*

As we age, our ability to synthesize lipoic acid decreases. Age also brings an accumulation of oxidized proteins that interfere with mitochondrial efficiency. LA's status as a so-called “mitochondrial nutrient” addresses this situation.¹⁹ Furthermore, aging is accompanied by a decreased ability of the liver to recycle ascorbic acid following oxidative stress. R-lipoic acid, after two weeks of supplementation to aged rats, reversed the age-related impairment of ascorbic acid recycling and concentration in liver cells.²⁰ A second study confirmed these results. Researchers determined that an RLA-supplemented diet fed to old rats for two weeks resulted in improved mitochondrial function, decreased free radical damage, and increased metabolic rate. Whereas a significant decline was seen in ascorbic acid and glutathione levels in the livers of the control rats, the RLA-supplemented group showed no decline in the levels of these critical antioxidants.²¹

Supports cognitive function and brain health*

Aging is associated with oxidative stress in the brain. The brain's high rate of metabolism and its long-lived neurons make it particularly vulnerable to oxidative stress. Since LA interrupts cellular oxidative processes in both its oxidized and reduced forms, it plays a modulatory role in the brain and nervous system. One group of researchers found that LA decreased oxidative stress in the brain mitochondria of aged rats.²² This kind of activity inside of neurons may help explain the observed effect of LA administration on cognitive upkeep in an animal model. Evidence of cognitive benefits has cropped up in multiple studies on normal old mice, including one where longer-term memory was enhanced by LA.¹⁹ There are probably several mechanisms—in tandem with decreased oxidative stress—behind the cognitive support seen in these animal studies, including stimulated production of acetylcholine and enhancement of memory-related signaling pathways.¹⁹ Preliminary research on humans suggests that LA supports sustained cognitive function in older age.^{23,24}

Supports eye health*

Studies also indicate that supplementation with alpha-lipoic acid supports eye health. One of the most toxic chemicals in cigarette smoke, acrolein, is especially harmful to retinal pigment epithelial cells. Rats chronically exposed to low doses of acrolein lose the viability of these cells, showing a

R-Lipoic Acid 100mg, 60VC

Supplement Facts

Serving Size 1 capsule
Servings per container 60 servings

	Amount per serving	% Daily Value
Biotin	150 mcg	50%
R-Lipoic Acid (from BioEnhanced®Na-RALA)	200 mg	†

† Daily Value not established.

Other ingredients: Modified cellulose (vegetarian capsule), cellulose, magnesium stearate (vegetable source), silicon dioxide.

Suggested Adult Use: Take 1 capsule once or twice daily, preferably between meals, or as recommended by a nutritionally-informed physician.

Non-GMO / Gluten Free / Vegan
Store in a cool dry place.

BioEnhanced® Na-RALA is a registered trademark of GeroNova Research, Inc.

R-Lipoic Acid 100mg, 180VC

Supplement Facts

Serving Size 1 capsule
Servings per container 60 servings

	Amount per serving	% Daily Value
Biotin	150 mcg	50%
R-Lipoic Acid (from BioEnhanced®Na-RALA)	200 mg	†

† Daily Value not established.

Other ingredients: Modified cellulose (vegetarian capsule), cellulose, magnesium stearate (vegetable source), silicon dioxide.

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decrease in mitochondrial function due to oxidative stress. Pretreatment of these retina cells with LA before the acrolein exposure significantly protected them from oxidative damage.²⁵ RLA is exceptionally suitable for supporting the retina of the eye. This was shown in rats, presumably via prevention of the activation of nuclear factor kappa B, a protein complex found in all cells that is involved in cellular responses to stimuli such as stress, free radicals, and ultraviolet irradiation.²⁶ Studies in rats also demonstrate LA's ability to support healthy retinal capillaries.²⁷



Supports cardiovascular health*

Alpha-lipoic acid may offer several different mechanisms in helping us to maintain cardiovascular health. From animal studies, researchers began to discover the impact of LA on blood lipids over half a century ago.²⁸ Additionally, a recent study in mice demonstrated results seen in previous studies using mice or rats: lipoic acid lowered body weight gain and fat mass.²⁹ Researchers attributed this to appetite suppression and enhanced energy expenditure. Mice in this same study also benefited from lower levels of triglycerides upon LA administration. While the favorable results seen in many of these *in vivo* studies have not yet been investigated in humans, researchers believe that LA supplementation holds promise for supporting the cardiovascular system through such means as helping to maintain a healthy weight and by promoting healthy lipid metabolism.

Stabilized R-Lipoic Acid vs. Controlled Release Products

Some companies are marketing controlled release or sustained release alpha-lipoic acid products, which maintain plasma concentrations for a longer period of time. However, available research adequately demonstrating the superiority of such products is lacking. Marketers of controlled release products claim that the therapeutic effectiveness of other lipoic acid products is limited due to the fact that it reaches peak concentrations in the bloodstream very quickly and therapeutic concentrations are not maintained. However, this is a misrepresentation of the large body of research indicating this is a fundamental beneficial property of lipoic acid, not a shortcoming.³⁰

Current scientific research into lipoic acid's mechanisms inside the body, rather than in the Petri dish, suggest that the rapid plasma clearance is fundamentally related to its safety and therapeutic action. Reaching an effective concentration is critical to the therapeutic action of lipoic acid, and rapid uptake and clearance from the bloodstream is a beneficial attribute rather than a shortcoming. Recent evidence indicates that inside the body, the antioxidant effect of lipoic acid is due to its ability to modulate gene expression and cell signaling molecules and to stimulate glutathione synthesis.³¹

R-Lipoic Acid 200mg, 60VC

Supplement Facts		
Serving Size 1 veggie capsule		
Servings per container 60 servings		
	Amount per serving	% Daily Value
Biotin	150 mcg	50%
R-Lipoic Acid	200 mg	†
<small>(from Sodium R-alpha Lipoate (BioEnhanced®Na-RALA))</small>		
† Daily Value not established.		

Other ingredients: Modified cellulose (vegetarian capsule), cellulose, magnesium stearate (vegetable source), silicon dioxide.

Suggested Adult Use: Take 1 capsule daily with or without food, or as recommended by a nutritionally-informed physician.

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