



## LIPOIC ACID SUPREME

HELPS THE BODY TO METABOLIZE CARBOHYDRATES, FATS AND PROTEINS

60 VEGETARIAN CAPSULES | NPN80049362 | LAS060-CN

Lipoic Acid Supreme contains 300 mg of lipoic acid, along with 4 mg of pure biotin and 500 mg of taurine, and is formulated to help support normal blood sugar and insulin balance. Lipoic acid is a sulfur-containing compound that exhibits amphipathic antioxidant properties, making it effective in both water and lipid-based environments. This unique property allows it to quench free radicals in hydrophilic and lipophilic environments alike, such as cytosol, plasma membranes, serum, and lipoproteins.<sup>1,2</sup> Lipoic acid is best known for its antioxidant capacity, but this molecule has also been shown to have potent effects on blood glucose control via insulin secretion and sensitivity, along with contributing to metal detoxification.

Mammalian tissues synthesize endogenous lipoic acid, but humans do so in very small amounts, and therefore, are better suited to absorb it from exogenous sources. Moreover, some health conditions may benefit from higher amounts via supplementation, and lipoic acid has demonstrated safety at relatively high doses.<sup>3,4</sup> The concentration of lipoic acid shown to exert pharmacological effects is greater than what is commonly bioavailable from foods. The richest dietary sources of lipoic acid are mammalian proteins with high metabolic activity, such as the heart, liver, and kidneys, all of which have a limited presence in the modern Western diet.<sup>1,2,5</sup>

### ANTIOXIDANT FUNCTION AND METAL DETOXIFICATION

Lipoic acid (LA) exerts direct antioxidant effects on various forms of free radicals and also plays a role in regenerating other potent antioxidants. Its oxidized form (lipoic acid) and its reduced form, (dihydrolipoic acid or DHLA), have overlapping and independent scavenging actions on different free radicals. Both forms have been shown to scavenge hydroxyl and peroxy radicals, while LA is effective against singlet oxygen and DHLA has been shown to quench superoxide.<sup>5,6</sup> Moreover, lipoic acid is known as an “antioxidant of antioxidants”; when reduced to DHLA, it serves to regenerate vitamins E and C, glutathione, and coenzyme Q10.<sup>2,7</sup> Coupled together, oxidized and reduced lipoic acid have a greater redox potential than oxidized and reduced glutathione, leading some researchers to refer to lipoic acid as a “universal antioxidant.”<sup>2</sup>

An additional effect of lipoic acid’s antioxidant capacity is its role in binding free, redox-active metals that can induce oxidative damage. LA has been shown to bind copper, manganese, zinc, and lead; whereas DHLA is effective at binding copper, zinc, lead, mercury, cadmium and iron.<sup>2,7,8</sup>

Related to its role as a water- and lipid-soluble antioxidant, lipoic acid also serves as an important cofactor for mitochondrial enzymes involved in cellular metabolism and energy (ATP) production, specifically pyruvate dehydrogenase and  $\alpha$ -ketoglutarate dehydrogenase.<sup>1</sup>

## INFLUENCE ON BLOOD GLUCOSE METABOLISM AND INSULIN SENSITIVITY

Several studies have demonstrated that lipoic acid aids in glucoregulation by facilitating proper functioning of the insulin receptor and recruitment of insulin-sensitive and insulin-independent glucose transporters (GLUT-4 and GLUT-1, respectively) to muscle and adipose cell membranes.<sup>5,6</sup> The capacity of lipoic acid to enhance glucose uptake in insulin resistant cells is increased when combined with exercise. A synergy exists between the two, which results in more efficient glucose handling than with either intervention alone.<sup>10</sup>

A downstream result of lipoic acid's favorable influence on blood glucose metabolism is its ameliorating effect on diabetic neuropathy. A study in which diabetic patients were given 600 mg of oral lipoic acid daily resulted in a significant improvement in total symptoms of polyneuropathy, including "stabbing pain, burning pain, paresthesia, and asleep numbness of the feet."<sup>11</sup>

## ADDITIONAL HIGHLIGHTS

Taurine is included in this formula because this sulfur amino acid has demonstrated antioxidant functions and may support healthy blood glucose control. Other animal studies suggest that taurine modulates glucagon secretion in addition to insulin secretion, thereby supporting overall healthy pancreatic function and dynamic endocrine response to changing blood glucose levels.<sup>15</sup> Taurine also influences peripheral insulin sensitivity by affecting phosphorylation and activation of the insulin receptor in skeletal muscle and liver tissue.<sup>16</sup> This nutrient is also an antioxidant, with ROS scavenging capacity and a protective effect against membrane lipid peroxidation.<sup>17,18</sup>

Biotin is an effective aid for glucoregulation and overall fuel partitioning. Lipoic acid increases the need for biotin by lowering levels of biotin-dependent enzymes; thus lipoic acid should always be taken with biotin. As a required cofactor for four carboxylase enzymes, this B vitamin plays an important role in the metabolism of carbohydrates, lipids, and amino acids, and thus, overall energy production.<sup>19</sup>

## BENEFITS

- Powerful antioxidant properties (collagen-protective)
- Supports normal blood sugar metabolism and insulin sensitivity
- Aids with heavy metal detoxification

## Medicinal Ingredients (per capsule):

Taurine (Aminoethanesulfonic acid) .....	500 mg
DL-alpha-Lipoic acid .....	300 mg
Biotin.....	4 mg

**Non-Medicinal Ingredients:** Hypromellose, silicon dioxide, magnesium stearate (vegetable source), stearic acid (vegetable source). **Recommended Dose:** Adults: Take 1 capsule per day with a meal, or as directed by your health care practitioner.

## REFERENCES

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# Lipoic Acid Supreme

Natural support for healthy blood sugar levels

Lipoic Acid Supreme is a formula designed to help support healthy blood sugar levels and insulin balance. It combines lipoic acid with the amino acid taurine and biotin -a member of the B vitamin family. Long-term supplementation of lipoic acid may reduce biotin levels because lipoic acid competes for biotin-dependent enzymes. Therefore, it is recommended that they are supplied together. Taurine and biotin also play important roles in fostering healthy insulin function.

## Benefits of Lipoic Acid

Lipoic acid is a naturally occurring compound produced in the body that acts as a *strong antioxidant* and also supports the *regulation of blood sugars*. Studies indicate that lipoic acid aids healthy blood sugar levels by optimizing the function of insulin receptors (the sites where the insulin attaches so it can do its job) in order to support proper insulin balance.

Antioxidants are substances that fight damaging free radicals in the body and, thus, are critical to the body's overall health and energy. Lipoic acid acts as an antioxidant, but also regenerates other important antioxidants, such as vitamins E and C.

## Additional Highlights of Lipoic Acid Supreme

- **Biotin** is a member of the B complex involved in the manufacturing of fatty acids and glucose. It supports the health of the skin, nerves, digestive tract, metabolism and cells. It also helps to support healthy insulin sensitivity, which means that the body is able to use insulin efficiently and effectively to help maintain healthy blood sugar levels.
- **Taurine** is an amino acid that regulates the level of water and mineral salts in the blood. It also possesses beneficial antioxidant properties and assists with a healthy inflammatory response.

## Recommended Use:

As a dietary supplement, take one capsule per day with meal, or as directed by your health care practitioner.



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