Alpha-lipoic acid (1,2-dithiolane-3-pentanoic acid)

Background

- Alpha lipoic acid (ALA) is made naturally in the body and may protect against cell damage in a variety of conditions. Food sources rich in alpha lipoic acid include spinach, broccoli, and yeast.
- Alpha lipoic acid, known as the "universal oxidant," has been used for decades in Europe, especially Germany, to treat nerve conditions, including nerve damage resulting from poorly controlled diabetes.
- There is strong evidence that alpha lipoic acid may help treat type II diabetes and neuropathy. According to a survey of 685 herbalists, alpha lipoic acid was one of the 10 most frequently recommended dietary supplements due to its efficacy in reducing high blood sugar levels.
- There is not enough data to support the use of alpha lipoic acid in Amanita poisoning, which has reportedly been a common practice for many years.
- The therapeutic use of alpha lipoic acid is not approved by the U.S. Food and Drug Administration (FDA) or corresponding regulatory agencies in other countries.

Scientific Evidence

Uses

- Diabetes
  Many studies have shown that ALA may improve blood sugar levels among patients with type 2 diabetes. Higher-quality studies are needed to provide more definitive answers in the future. Diabetes is a serious illness and should be treated under the supervision of a qualified healthcare provider.

- Neuropathy (nerve pain or damage)
  Many studies have shown that alpha lipoic acid is an effective treatment for nerve pain or damage (neuropathy) associated with diabetes or cancer treatment.
Alcoholic liver disease
ALA has been studied as a treatment for alcohol-related liver disease. However, benefits have not been observed at this time. More research is needed in this area.

Cognitive function (HIV)
ALA has been studied as a treatment for cognitive impairment caused by nerve damage in HIV patients. At this time, there is not enough scientific evidence to recommend ALA for treating this condition.

Glaucoma
There are some human studies of ALA as a treatment for glaucoma, but there is not enough scientific evidence to make a recommendation at this time.

Kidney disease
ALA may provide some benefit in kidney disease, but there is not enough evidence to recommend this use.

Pain (burning mouth syndrome)
ALA shows some promise as a treatment for burning mouth syndrome, a condition that causes the mouth to feel hot or tingly. Additional research is needed before any recommendations can be made.

Pancreatic cancer
ALA has not been well studied for pancreatic cancer in humans. A case report shows that alpha lipoic acid may help prevent cancer progression. However, high quality studies are needed before a conclusion can be made.

Postoperative tissue injury prevention (ischemia-reperfusion injury after liver surgery)
When blood supply to an organ is blocked, it is called ischemia. When the blood supply is restored (called reperfusion), the resulting swelling and stress can lead to organ damage. Treatment with ALA before liver surgery may help prevent this type of damage. However, more research is needed.

Radiation injuries
Early evidence suggests that ALA may be beneficial to people exposed to high levels of radiation. Well-designed studies are needed before ALA can be recommended for this use.

Skin aging
Early research shows that a skin cream containing ALA may help improve signs of skin aging. More research is needed before any recommendations can be made.

Wound healing (in patients undergoing hyperbaric oxygen therapy)
ALA may reduce tissue damage that is often caused by long-term exposure to high levels of oxygen. While early studies are promising, more research is needed to fully understand how this might work.

Tradition/Theory
The below uses are based on tradition, scientific theories, or limited research. They often have not been thoroughly tested in humans, and safety and effectiveness have not always been proven. Some of these conditions are potentially serious, and should be evaluated by a qualified healthcare provider. There may be other proposed uses that are not listed below.

- Age-associated memory impairment, altitude (mountain) sickness, Alzheimer's dementia, amanita phalloides mushroom toxicity, antioxidant, appetite/weight loss in cancer patients, atherosclerosis (clogged arteries), atopic dermatitis, bile flow stimulation, blood disorders (erythropoietic protoporphyria), blood vessel disease (brain, endothelium), bone loss, brain damage (degenerative, copper-induced oxidative damage), cancer, cardiovascular disorders (cerebrovascular disease), central nervous system disorders, chemotherapy adverse effects, cirrhosis, constipation, contact dermatitis, deficiency (zinc), dementia, depression, Down's syndrome, endocrine disorders (metabolic syndrome), gastrointestinal conditions (gastromucosal protection), hearing damage (from certain drugs), heart damage from doxorubicin (Adriamycin®, Doxil®), hepatitis (hepatitis C), high blood pressure, high cholesterol, HIV/AIDS, immune system stimulant, inflammation, inflammatory conditions (inflammatory vascular diseases), kidney protection, lactic acidosis (lipoamide dehydrogenase deficiency), lead toxicity, liver disease, memory, metabolic disorders (Leigh's disease, porphyria, Krabbe disease), mitochondrial diseases, multiple sclerosis, muscular dystrophy (facioscapulohumeral dystrophy), neural tube defects, neuroprotection, nutritional supplement, obesity, Parkinson's disease, post-operative
pain, psoriasis, retinal protection (leukostasis, retinal ischemia/reperfusion), retinopathy, scurvy, sepsis (prevention and treatment), sickle cell anemia, smell disorders, stomach problems, stroke, toxic kidney damage (oxaliplatin-induced, cyclophosphamide cytotoxicity, mercury-induced), vitamin E deficiency, Wilson's disease (a hereditary disorder).

Dosing

The below doses are based on scientific research, publications, traditional use, or expert opinion. Many herbs and supplements have not been thoroughly tested, and safety and effectiveness may not be proven. Brands may be made differently, with variable ingredients, even within the same brand. The below doses may not apply to all products. You should read product labels, and discuss doses with a qualified healthcare provider before starting therapy.

Adults (18 years and older)

- **General**: In general, experts believe it is safe to use alpha lipoic acid (ALA) at recommended doses for up to two years.
- **Alcoholic liver disease**: A dose of 300 milligrams of thioctic acid has been taken daily in three divided doses for up to 24 weeks.
- **Cognitive function (HIV)**: A dose of 600 milligrams of ALA has been taken twice daily for 10 weeks.
- **Diabetes**: Doses of 600-1,800 milligrams of ALA have been taken by mouth daily. Doses of 500-1,000 milligrams of ALA per 50-500 milliliters of sodium chloride have been injected.
- **Drug-induced cardiotoxicity**: A dose of 100 milligrams per kilogram (-1) of ALA reportedly reduced heart damage caused by the anti-cancer drug doxorubicin in a poorly described study.
- **Glaucoma**: A dose of 150 milligrams of ALA has been taken for one month.
- **Ischemia-reperfusion injury protection**: A dose of 600 milligrams of ALA in 50 milliliters of sodium chloride has been injected.
- **Kidney disease**: For 12 weeks, patients undergoing hemodialysis took 600 milligrams of ALA daily.
- **Neuropathy**: 600-1,800 milligrams of ALA has been taken by mouth daily in divided doses from three weeks to two years. A dose of 600 milligrams of ALA has been injected daily for 5-10 days.
- **Pain (burning mouth syndrome)**: A daily dose of 200-600 milligrams of ALA has been taken by mouth for up to two months.
- **Wound healing (in patients undergoing hyperbaric oxygen therapy)**: A dose of 300 milligrams of ALA has been used one hour before exposure to oxygen and immediately after therapy. Then, patients took 300 milligrams twice daily for the next 30 treatments.

Children (younger than 18 years)

- The dosing and safety of ALA have not been well-studied studied in children, and therefore, ALA cannot be recommended.

Safety

The U.S. Food and Drug Administration does not strictly regulate herbs and supplements. There is no guarantee of strength, purity or safety of products, and effects may vary. You should always read product labels. If you have a medical condition, or are taking other drugs, herbs, or supplements, you should speak with a qualified healthcare provider before starting a new therapy. Consult a healthcare provider immediately if you experience side effects.

Allergies
• People with allergies or hypersensitivities to alpha lipoic acid (ALA) should avoid its use. Pain and redness has occurred around a needle site when ALA was injected through a vein. Allergic skin reactions (called contact dermatitis) have occurred after an ALA anti-wrinkle cream was used.

Side Effects and Warnings

• Few side effects have been reported from alpha lipoic acid (ALA). The most common complaints include nausea, vomiting, and dizziness, all of which occurred with doses of 1,200-1,800 milligrams.
• Caution should be used among patients with type 2 diabetes, due to the possibility of changes in insulin sensitivity and trace element deficiency. A case of insulin autoimmune syndrome, a rare disease that causes the immune system to mistakenly attack insulin, leading to low blood sugar levels, was reported after ALA use. Blood glucose levels may need to be monitored by a qualified healthcare professional, including a pharmacist, and medication adjustments may be necessary.
• Although not well studied in humans, ALA should be used with caution in people with thyroid diseases (hypothyroidism), and should be avoided in patients with thiamine deficiency, a condition commonly associated with alcoholism.

Pregnancy and Breastfeeding

• There is not enough scientific evidence available to recommend using alpha lipoic acid (ALA) during pregnancy or breastfeeding.

Interactions

Most herbs and supplements have not been thoroughly tested for interactions with other herbs, supplements, drugs, or foods. The interactions listed below are based on reports in scientific publications, laboratory experiments, or traditional use. You should always read product labels. If you have a medical condition, or are taking other drugs, herbs, or supplements, you should speak with a qualified healthcare provider before starting a new therapy.

Interactions with Drugs

• Alpha lipoic acid (ALA) may lower blood sugar levels. Caution is advised when using medications that may also lower blood sugar. Patients taking drugs for diabetes by mouth or insulin should be monitored closely by a qualified healthcare professional, including a pharmacist. Medication adjustments may be necessary.
• ALA may alter thyroid levels. Caution is advised in people diagnosed with thyroid disease. Patients using drugs for thyroid disease should be monitored closely by their healthcare providers while using ALA. Dosing adjustments may be necessary.
• ALA, when given with doxorubicin, provides a protective effect against heart damage. This may improve the therapeutic index of doxorubicin when given with ALA. ALA also seems to possess protective effects when administered with Adriamycin®, although further research is needed to confirm these results.
• ALA may interact with cancer treatments, antibiotics, drugs used to treat osteoporosis, and drugs that help widen blood vessels (vasodilators). ALA may decrease the effects of anti-inflammatory and may increase the effects of weight loss aids. Patients who have taken calming medications, called tranquilizers, may not respond well to ALA.
• ALA may affect the way in which the liver breaks down certain drugs.

Interactions with Herbs and Dietary Supplements
• Alpha lipoic acid (ALA) may lower blood sugar levels. Caution is advised when using herbs or supplements that may also lower blood sugar. Blood glucose levels may require monitoring, and doses may need adjustment.
• ALA may alter thyroid levels. Caution is advised in people diagnosed with thyroid disease. Patients using herbs or supplements for thyroid disease should be monitored closely by their healthcare providers while using ALA. Dosing adjustments may be necessary.
• ALA may interact with cancer treatments, antimicrobials, herbs or supplements used to treat osteoporosis, and herbs or supplements that help widen blood vessels (vasodilators). ALA may decrease the effects of anti-inflammatories, increase the effects of weight loss aids and antioxidants, and may increase the body's levels of vitamin C. Patients who have taken calming herbs or supplements, may not respond well to ALA.
• ALA may affect the way in which the liver breaks down certain herbs or supplements.

Author Information

• This information is based on a systematic review of scientific literature edited and peer-reviewed by contributors to the Natural Standard Research Collaboration (www.naturalstandard.com).

References

Natural Standard developed the above evidence-based information based on a thorough systematic review of the available scientific articles. For comprehensive information about alternative and complementary therapies on the professional level, go to www.naturalstandard.com. Selected references are listed below.


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