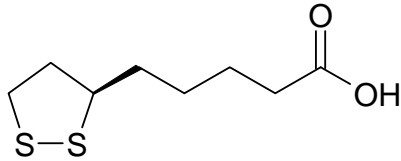


## Alpha Lipoic Acid



Alpha-lipoic acid, also known as lipoic acid, is an antioxidant with an important rejuvenating function in the body. As antioxidants deplete as they neutralize free radicals, lipoic acid reenergizes them by restoring vitamins A and E and glutathione. Through a balanced and healthy diet, the body can produce sufficient supplies of alpha, although it is also taken as a dietary supplement.

Alpha has many beneficial properties, including the ability to stimulate insulin and lower blood sugar levels. These attributes make it useful in treatments for diabetes, nerve problems, liver disease, AIDS and eye-related problems, including glaucoma and cataracts. Through gene regulation, Alpha may prevent or prolong atherosclerosis.

As an antioxidant, Alpha helps prevent the damaging effects of free radicals—waste products that are produced when food is turned into energy. Alpha, which recycles vitamins C and E to provide antioxidant protection, is an overall immune system booster that can help ward off many illnesses. It also repairs cell damage by promoting energy production in cells. In Europe, Alpha is used to reduce symptoms of diabetes, including pain, itching, and burning.

Insufficient levels of Alpha may result in immune and gastrointestinal dysfunctions, birth defects and delayed maturation. A number of conditions may arise that negatively affect the natural production of Alpha, including rare genetic disorders and high stress and trauma conditions that impair the synthesis of Alpha.

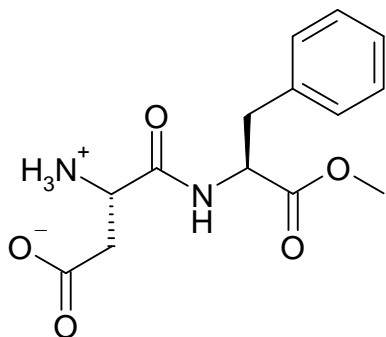
Alpha can be obtained through dietary sources, including broccoli, spinach, potatoes, liver, kidney and yeast.

It is recommended that Alpha be taken in balance with other amino acids. For an adult, the daily required dosage is 50 to 100 milligrams. The metabolism of alpha may be improved by combining it with other nutrient supplements, such as B vitamins.

*refeces.\* Jack Challem, Lipoic acid reduces appetite in animals, an effect that might account for some of its benefits in diabetics, Avery Publishing 2000.*

*\*Hagen TM, Ingersoll RT, Lykkesfeldt J, et al. (R)-alpha-lipoic acid-supplemented old rats have improved mitochondrial function, decreased oxidative damage, and increased metabolic rate. FASEB J. 1999; 13:411-418*

## Aspartame



Discovered accidentally in 1966 and first approved for use in 1974, aspartame is perhaps the most common low-calorie artificial sweetener in use today. Aspartame is composed of a combination of two naturally occurring amino acids, aspartic acid and phenylalanine, which are combined to create a powdered substance that is approximately 200 times sweeter than sugar. The potent sweetness and clean taste of aspartame makes it a very appealing sugar substitute from the point of view of manufacturers as well as consumers.

Substituting foods flavored with aspartame for those containing sugar may have several health benefits, including calorie reduction and weight loss. Because aspartame does not promote tooth decay, it is a safer choice than sugar for dental health. For persons with diabetes, aspartame may be of benefit in that it offers a safer substitute for sugar. It may therefore make it easier for persons with diabetes to adjust their diet and lifestyle to accommodate their health needs.

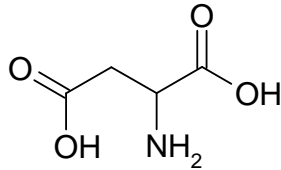
The amino acids that aspartame is composed of occur naturally in meat, grains and dairy products. Aspartame is found in a variety of processed foods, most notably soft drinks, dairy products, confectionery and powder mixes.

Aspartame is the most popular sweetener that is used to boost the sweetness intensity and remains stable in almost all confectionery products

The ADI for aspartame is 50 mg per kilogram of body weight. This is quite a large amount. It means that a person weighing approximately 150 pounds could safely consume up to 20 cans of soda containing aspartame daily without going over the ADI.

*References \* David J. Ager, David P. Pantaleone, Scott A. Henderson, Alan R. Katritzky, Indra Prakash, D. Eric Walters (1998). "Commercial, Synthetic Nonnutritive Sweeteners". Angewandte Chemie International Edition 37 (13-24): 1802-1817*

## Aspartic Acid



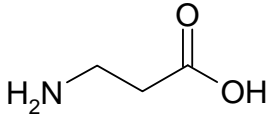
Aspartic acid, one of the two acidic amino acids, plays an important role in metabolism and in the construction of other amino acids and biochemicals. It is a necessary component in creating energy, participating in the citric acid cycle or Krebs cycle. Its function is integrated with those of other amino acids, and a balance of them is needed to ensure proper metabolic function. Aspartic acid is also essential in forming healthy DNA and RNA, reducing toxins in the liver by expelling ammonia, and producing antibodies. Aspartic acid is one of the non-essential amino acids, meaning that the body is capable of producing it. However, adequate production of aspartic acid is dependent on one's overall nutritional status. It is possible to have a deficiency of aspartic acid, and some people benefit from supplementation.

Aspartic acid has many benefits for the healthy functioning of brain and body. First, it increases energy, because it helps the body generate ATP, the chemical fuel that all cells need. For this reason, it increases stamina and endurance, and may be of some benefit to athletes in his capacity. It is also a vital for maintaining good health, as aspartic acid aids in the production of antibodies. Moreover, a deficiency of aspartic acid may be one of the factors contributing to chronic fatigue syndrome. We also know that people deficient in this amino acid may also suffer from fatigue and depression. In addition, aspartic acid keeps the brain thinking sharply, contributing to brain and neural health. Aspartic acid reduces toxins from the system; in particular, it enables the body to get rid of excess ammonia.

Like many of the other amino acids, aspartic acid is found primarily in concentrated protein sources. It may be obtained from beef, poultry, and dairy products. Sprouting seeds also contain aspartic acid. However, generally speaking, it is difficult to obtain from a vegetarian, especially vegan, diet.

*References* 1) Nelson, D. L.; Cox, M. M. "Lehninger, Principles of Biochemistry" 3rd Ed. Worth Publishing: New York, 2000. [ISBN 1-57259-153-6](https://doi.org/10.1002/9781118134271). 2) <http://www.pdrhealth.com/home/home.aspx>

## Beta Alanine



Beta-alanine is an amino acid that occurs naturally in many meats – notably, in chicken, beef, port and fish. Scientists have known of its existence for more than a century, but most clinical research regarding its benefits are much more recent. We now know that beta-alanine supplements are particularly useful to anyone wishing to increase muscle strength and endurance.

The build-up of hydrogen ions through lactic acid limits performance for almost everyone, regardless the muscle mass and the natural resistance to pain. According to a study presented to the American College of Sports Medicine in 2003, beta-alanine supplements really do improve performance by removing this primary limiting factor. Beta-alanine is taken concurrently with histidine (most supplements include both), because it is the combination of these two amino acids that is needed to produce carnosine.

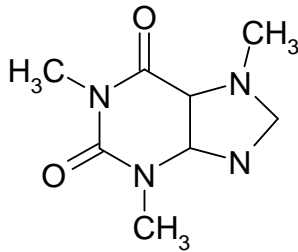
Incidentally, this works much better than taking a supplement of carnosine itself – straight carnosine tends to break down in the GI tract. Taking beta-alanine (along with histidine) allows the muscles to manufacture it, and is a much more reliable way to go.

As well as increasing endurance through the removal of factors causing fatigue and pain, there is some evidence indicating that beta-alanine supplementation actually makes muscles stronger. Muscles that contain a higher level of carnosine contract more strongly – basically, this means that they are stronger. The dual action of this supplement makes it invaluable to anyone looking to build strength and increase endurance.

**DOSE:** Take 1-1.5 grams of beta-alanine with 1-1.5 grams of histidine. Note that most supplements that provide beta-alanine also supply histidine.

*References Derave W, Ozdemir MS, Harris R, Pottier A, Reyngoudt H, Koppo K, Wise JA, Achten E. (Aug 9). "Beta-alanine supplementation augments muscle carnosine content and attenuates fatigue during repeated isokinetic contraction bouts in trained sprinters*

## Caffeine Anhydrous



Caffeine, a xanthine alkaloid compound, is a psychoactive and central nervous system stimulant. It has been shown to have no adverse health effects when taken in moderation and associated with a number of positive health effects.

Caffeine is associated with fighting fatigue and increasing alertness. While caffeine's effects on mental acuity have not been proven, it has been shown to have positive effects on job performance where alertness and stamina are a factor, such as shift work. In sports, caffeine contributes to increased endurance in athletes. The endurance effect is the strongest in athletes who are not regular users of coffee. This energy booster is also praised for reducing body fat in athletes.

Numerous studies over the years have not linked caffeine positively or negatively to heart disease or cancer. A Harvard study has linked caffeine to a reduced risk of type-2 diabetes. Recent studies have claimed that caffeine may reduce liver disease, Parkinson's disease and Alzheimer's disease.

Caffeine occurs naturally in coffee, tea and, in smaller amounts, cocoa. It is added to soft drinks and energy boosting beverages, often as an additive extracted from guarana berries. While caffeine is found in guarana (guaranine), mate (mateine) and tea (theine), these are not perfect substitutes. In recent years, for example, yerba mate has become a popular drink promoted by the health food industry as a 'healthful' substitute for caffeine. Coffee has approximately 100 milligrams of caffeine per 8 ounce cup of coffee; tea 47 mgs and yerba mate 30 mgs.

Before workout, 200-300 mgs one to two hours before is recommended. In studies, two cups of coffee a day has proven to increase alertness, yet no incremental increases are shown beyond two cups.

Caffeine has been shown to have an effect on the adenosine receptors, which are linked to anxiety and panic disorders. Some individuals are genetically prone to exhibit higher levels of anxiety in association with caffeine intake. Similarly, caffeine may contribute to nervousness and reduce fine motor coordination. Caffeine can be addictive; headaches are a common withdrawal symptom. The high acidity in caffeine



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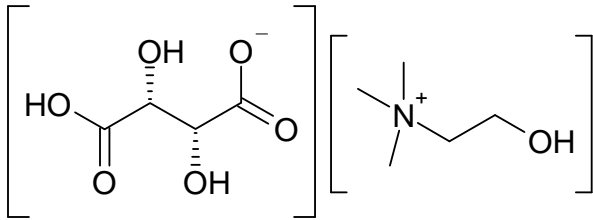
may introduce gastrointestinal disorders. Due to caffeine's positive effects on alertness, it is recommended that it not be consumed four hours prior to bedtime.

References:\* JimSource:Men's Health; Oct2004, Vol. 19 Issue 8, p172-176, 4p,

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If you have any questions regarding this or other product(s),  
please don't hesitate to contact us and we will do our best to assist you.

## Choline Bitartrate



Choline Bitartrate has been used for many years as a source of dietary choline. Choline is one of the B vitamins. Like other B vitamins, it is involved in a variety of intricate biochemical reactions involving multiple systems of the body, including the brain, muscles, and internal organs. Specifically, we need choline in order to form healthy cell membranes, break down cholesterol, and aid in the function of neurotransmitters in the brain.

Supplementing with Choline Bitartrate has a wide range of benefits. First, choline prevents muscle damage and degeneration, and improves the functioning of the liver and other organs. Because of this, it helps prevent conditions such as a 'fatty liver'. Studies show that this is particularly important in men and post-menopausal women. Choline also helps lower homocysteine levels. It can help prevent osteoporosis. Furthermore, because it supports neurotransmitters in the brain, it is important for memory and other cognitive tasks. In fact, studies show that people with Alzheimer's disease are often deficient in choline.

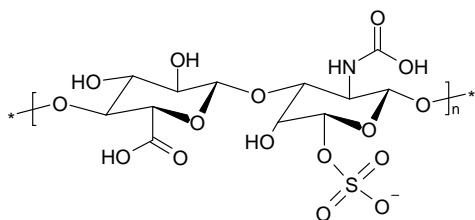
In short, the effects of choline are many and complex. And, whereas most people manage to get an adequate amount of this vitamin through their food, supplementing with Choline Bitartrate may enhance these vital bodily functions as well as preventing potentially harmful deficiencies.

Choline is found in a wide range of protein-rich foods, both from animal and vegetarian sources. You can get choline by eating eggs (particularly the yolks), lamb, veal, and fish, as well as beans, nuts and soy lecithin.

550 mg of choline per day is considered adequate for most individuals. Supplementing with Choline Bitartrate is considered safe and beneficial in amounts up to 3 grams daily.

*References* 1)Albright CD, Liu R, Berthea TC, et al. Choline deficiency induces apoptosis in SV 40-immortalized CW SV-1 rat hepatocytes in culture. *FASEB J.* 1996; 10:510-516. 2) Blusztajn JK. Choline, a vital amine. *Science.* 1998; 281:794-795.

## Chondroitin Sulfate Sodium



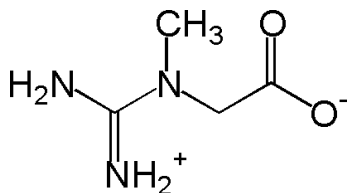
Chondroitin sulfate is commercially sold in the form of its sodium salt, namely chondroitin sulfate sodium. It is an ingredient in dietary supplements that are used widely for treating osteoarthritis, a chronic disease that occurs with the degeneration of joints. Chondroitin sulfate is made up of a chain of sugars and is typically found attached to proteins. This combination of molecules offers incredible structural strength. As a result, chondroitin sulfate is an essential component to cartilage (connective tissues in the body) due to its structure and its resistance to compression. Without chondroitin sulfate, no water or nutrients can move into and out of cartilage.

The body produces chondroitin sulfate naturally; however, it is possible to be deficient in this vital supplement as it may be reduced in joint cartilages which are affected by osteoarthritis or other forms of arthritis. Because chondroitin is not a uniform substance, it is naturally found in many varieties of forms. Most chondroitin sulfate are made from extracts of animal tissues rich in cartilage. These include pig ear and nose, cow trachea, and chicken cartilage. Other more expensive sources come from shark and fish. Even though chondroitin sulfate is a prescription drug in 22 countries, it is regulated by the Food and Drug Administration in the US as a dietary supplement. Now there are United States Pharmacopoeia (USP) test standards for the identification and quantification of chondroitin sulfate.

A typical dose of 400mg taken three times daily is administered for those with osteoarthritis. When dissolved in water and consumed orally, chondroitin sulfate is quickly absorbed through ingestion. It is recommended that no more than 10g should be taken in one day as it may cause nausea.

Reference: (1) [http://en.wikipedia.org/wiki/Chondroitin\\_sulfate#Medical\\_use](http://en.wikipedia.org/wiki/Chondroitin_sulfate#Medical_use)  
(2) <http://www.puritan.com/pages/healthnotes.asp?languri=eng&ContentID=2828008>

## Creatine Monohydrate



The nutrient creatine, whose name is derived from the Greek word for “flesh”, is an integral part of the skeletal muscle of all higher animals, including humans. Creatine has been used in supplement form for several decades by those wishing to increase strength and endurance. Scientists have been aware of creatine and its important role in building strength for almost 20 years. More recently, studies have shown that it is effective in combating muscle and brain disease or injury.

Creatine plays an important role in the formation and recycling of energy, called ATP, in the muscles. Without sufficient creatine, the total amount of the “energy producing molecule” ATP degenerates, and the release of new energy is slower. With creatine, regeneration of ATP happens quickly and efficiently. It also acts as an anti-inflammatory, preventing muscle soreness. The fitness benefits of creatine are very significant.

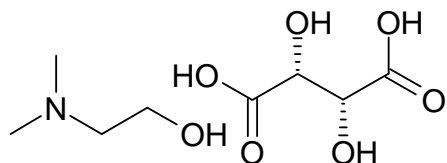
Creatine also prevents muscle atrophy and loss. This is what makes it so effective at counteracting the effects of aging. As we age, muscle loss and a decline in strength and endurance is common, but supplementing with creatine halts or slows down those effects. Muscles stay younger and more vital for longer.

Creatine is found primarily in meat and fish. People who eat meat may already have an ample supply, whereas vegetarians are more likely to have lower levels of creatine.

Healthy individuals will benefit from a recommended 2 – 3 grams of creatine per day. For those using the nutrient as part of their recovery from brain injury or muscle dystrophy, the amount recommended is 5 – 10 grams per day.

References \*Racette SB. Creatine supplementation and athletic performance. J Orthop Sports Phys Ther. 2003 Oct;33(10):615-2. \*Clarkson PM, Rawson ES. Nutritional supplements to increase muscle mass. Crit Rev Food Sci Nutr 1999 Jul;39(4):317-28.

## DMAE Bitartrate Natural Grade



Dimethylaminoethanol (DMAE) is a compound found in fish that supports healthy brain function. Since it is only produced in small amounts naturally in the body, supplementation is recommended. Like the omega-3 fatty acids also found in fish, DMAE is known for its ability to boost brain power.

DMAE's ability to improve the functioning of the brain makes it useful in treating a variety of cognitive and disruptive disorders, including attention-deficit disorder (ADD) and memory lapses. It has also been used in the treatment of depression.

Specifically, DMAE supports the production of acetylcholine, a critical neurotransmitter that carries messages between brain cells and the muscles that control the body's movements. Acetylcholine is also involved in higher brain functions, including memory and learning. Due to DMAE's ability to stimulate acetylcholine and therefore memory, it is being used to treat disorders like Alzheimers. It may also help alleviate memory lapses associated with normal aging.

DMAE is also used in the treatment of hyperactivity and learning disorders. Due to growing concerns over the effects of medication like Ritalin, more researchers are investigating the use of DMAE to treat ADD in children.

A deficiency of DMAE can impair the body's ability to produce the neurotransmitters that affect mental mood and alertness. This can result in mood disorders, such as depression and hyperactivity.

DMAE can be found in high concentrations in anchovies and sardines.

To treat memory lapses associated with normal aging, DMAE is often prescribed with other memory enhancing compounds, such as phosphatidylcholine.

For an adult, a daily dosage of 100 mg is recommended. To treat Alzheimer's, higher daily dosages of 1,000 mg or more may be recommended under a doctor's supervision.

Growing children, pregnant women, and nursing mothers should obtain a doctor's approval before taking DMAE. DMAE may cause drowsiness and a mild increase in blood pressure. Large doses may cause muscle tension.

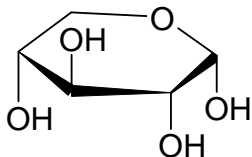
Treatment of diseases and disorders, including Alzheimer's and ADD, should be done under a doctor's supervision. UniChem Enterprises offers DMAE Bitartrate Natural Grade in stock in our strategically located warehouses at a competitive price. Please call the number below for more information.



**Warehouses: Los Angeles - Chicago – New York - Canada**

References\* Ward D. Smart drugs and nutrients: howto improve your memory and increase your intelligence using the latest discoveries in neuroscience. Petaluma, CA: Smart Publications; 1992\* Perry E, Walker M, Grace J. Perry R. Acetylcholine in mind: a neurotransmitter correlation of consciousness? Trends Neurosci, 1999 Jun;22(6):273-80.

## D-Xylose



Commonly known as wood sugar, D-xylose is often used as a food additive in flavor and pet food industries. Combined with certain amino acids in controlled concentration, time, temperature and acidity levels, xylose is used for flavor enhancement by a chemical reaction called the Maillard Reaction. Flavors such as roast beef, roast pork, boiled meat, chicken and baked potato can be developed. D-xylose is also used to create the golden brown color in many baked goods to give them an appealing appearance.

Along with 7 other essential sugars, D-xylose is needed for the well-maintained health and functions in the body. It has both anti-bacterial and anti-fungal properties. Recent research shows that D-xylose may even be help prevent cancer in the digestive system. It is a great sugar substitute for chewing gum, toothpaste and corn sweeteners. Unlike sucrose, the naturally occurring simple sugar, D-xylose does not promote cavities and has fewer calories. For many diabetics, D-xylose or its commercial derivative, xylitol, is a very suitable sweetener substitution.

In addition to its role as a food additive or sweetener, D-xylose is administered to test if nutrients are absorbed properly. Patients are asked to fast for 8 – 12 hours and then drink a specified amount of D-xylose dissolved in water. A blood sample is then taken 2 hours later and a urine sample is taken 8 hours later. If D-xylose is detected in blood or urine, this is a positive result and this means that it has been absorbed into the intestines. The D-xylose absorption test is especially useful to in determining if nutrition absorption problems are due to disease of the intestines or the pancreas.

### References:

- (1) [http://www.danisco.com/cms/connect/corporate/products%20and%20services/product%20range/sweeteners/d%20xylose/d\\_xylose\\_en.htm](http://www.danisco.com/cms/connect/corporate/products%20and%20services/product%20range/sweeteners/d%20xylose/d_xylose_en.htm)
- (2) <http://www.nlm.nih.gov/medlineplus/ency/article/003606.htm>
- (3) <http://www.glyconutrient.biz/xylose.htm>

## **Fructus Lycii (Goji berries or Wolfberries)**

Commonly known as “goji berry” or “wolfberry”, fructus lycii is the more technical term for the small red berries that are packed with nutrients. These berries have been cultivated and consumed for about five thousand years in China. They are notorious for their high nutritious value and are used in traditional Chinese medicine. Beginning in the early 21<sup>st</sup> century, the United States and other developed countries also began recognizing the berry by its nutrient richness and antioxidant qualities.

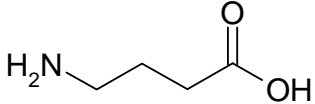
Outside their production region, fructus lycii are usually found in their dried form. They usually look like thin raisins and are red or orange in color. Fructus lycii contains a great amount of macronutrients – carbohydrates, protein, fat and dietary fiber – for daily intake. However, they also carry numerous micronutrients, including 18 amino acids, 6 essential vitamins, 33 dietary minerals, calcium, potassium, iron and much more. In traditional Chinese medicine, it is believed that fructus lycii can enhance the immune system, defend the liver from toxins, boost sperm count, and improve eyesight and circulation, among other benefits. They can be eaten raw, consumed as juice or wine, or brewed into an herbal tea.

Research shows that, when eaten raw, the berries pass through the body undigested because a great amount of stomach acid is needed to break down the berries. Thus, it is more efficient to drink its juices instead. On the other hand, it is believed that the juice of fructus lycii is more beneficial due to its synergistic effects: when combined with vitamins and essential oils of other fruits, the nutrients and antioxidants within the berries themselves are much better absorbed into the body. As a result, fructus lycii juice is often mixed with other fruit juices such as pomegranate or cranberry juice.

References: (1) [http://en.wikipedia.org/wiki/Wolfberry#Nutrient\\_content](http://en.wikipedia.org/wiki/Wolfberry#Nutrient_content)

(2) <http://www.chinesewolfberry.com/chinese-wolfberry-facts/wolfberry-benefits.html>

## GABA (Gamma Amino Butyric Acid)



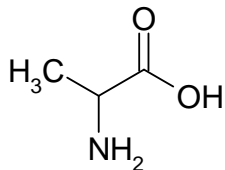
GABA, is a non-essential amino acid – the term 'non-essential' does not relate to its importance, but to the fact that this amino acid can be synthesized by the body as long as other nutritional factors are present. GABA primarily affects the brain, and, consequently, the emotions. Along with serotonin, it is one of the most important inhibitory neurotransmitters. Neurotransmitters in general are substances which cross the synapses between nerve endings and allow them to communicate more efficiently. As an inhibitory neurotransmitter, however, the way GABA works is by filtering out many of the extraneous signals that reach the brain at any given time. Where these are not filtered, anxiety or panic disorders are a common result. Consequently, GABA is considered a 'calming' neurotransmitter.

GABA's primary benefits relate to its function as a 'calming' neurotransmitter – it may effectively reduce anxiety, combat the effects of stress, and promote healthy sleep patterns. Individuals suffering from anxiety disorders, panic attacks or anxiety may in fact be experiencing the effects of low levels of GABA, or low GABA activity. Supplementing with GABA might benefit these individuals, and is a great alternative to pharmaceutical drugs. Moreover, there is evidence that GABA might also be effective in improving mental focus, and in treating conditions such as addiction, headaches, and even Parkinson's disease.

Some evidence also indicates that GABA may promote fat loss by stimulating the production of human growth hormone (HGH). HGH has the effect of building muscle, and normally decreases after a person reaches a certain age or stage of life. By promoting the continued production of HGH, GABA may counteract some of these effects of aging, and build strength and endurance throughout life. A standard dose for GABA supplementation is 200 mg three times a day.

*References* 1) Challem, Jack "Ease anxiety with GABA" *Better Nutrition*, Dec2007, Vol. 69 Issue 12, p24-24, 1p. 2) Sahley, Billie "GABA: The Brain and how it Effects our Behavior" *Health Educator Reports*, 2006, p1-2, 2p;

## L-Alanine



L-Alanine is an amino acid that helps the body converting to glucose into energy, regulating blood sugar, increasing endurance and improving the absorption of other nutrients. L-Alanine is a non-essential amino acid, meaning that the body is capable of generating it. However, studies have shown that alanine supplements can have a variety of benefits for certain people.

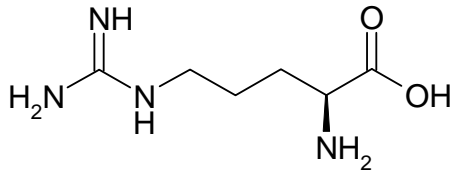
L-Alanine is of great benefit in body building, because it protects muscles from being damaged or consumed during vigorous activity. It will improve endurance and muscle strength as well as energy. Moreover, because alanine cycles glucose through the body, enabling the body to use it as an energy source, it can also reduce fat stores. Excess sugar in the system will get used up as energy more efficiently rather than being stored as fat.

Sufficient levels of alanine are necessary to metabolize other nutrients and vitamins, particularly B-vitamins. In fact, this is true of all amino acids, and it is important not to let any of them get out of balance in the system. L-Alanine has another benefit – in clinical studies, it has been shown to alleviate the symptoms of an enlarged prostate caused by benign prostate hyperplasia.

L-Alanine is found in most foods containing protein, particularly animal protein. It is abundant in meat, fish, poultry, eggs and dairy products. It is also found in certain high protein vegetable sources, such as avocado. L-Alanine is also generated in the body; however, a person has to be healthy and well nourished in the first place in order to produce enough alanine. People who are malnourished or have a deficiency of protein are lacking L-Alanine in their diets, and may also not be able to produce it in sufficient quantities.

- References*
1. Molecular Biology LabFax, Brown, T. A., ed., BIOS Scientific Publishers Ltd. (Oxford, UK: 1991), p. 29.
  2. The Merck Index, 12th ed., Entry# 205.

## L-Arginine



Arginine, a non-essential protein amino acid, is naturally produced by the body and found in many foods. Through a balanced and healthy diet, the body can produce sufficient supplies of Arginine, although it is also taken as a dietary supplement.

Arginine has shown to assist in the treatment and prevention of cardiovascular disease, kidney disorders, infertility and wound healing. Its many benefits include improving the immune system, detoxifying the liver, increasing blood flow and aiding in the release of insulin and growth hormones. As an immune system enhancer, Arginine can protect against cancer, tumor growth and diseases that suppress the body's immune system, such as AIDS. Specifically, Arginine increases activity in the thymus gland, which manufactures T-cells, strengthening the immune system by creating more T-cells.

Arginine also produces nitric oxide synthesis, which relaxes and dilates blood vessels, thereby increasing blood flow to the heart and brain. These same beneficial qualities are also helping to treat men with fertility and erection problems. By increasing nitric oxide, blood flow in the genital area is increased. More recent areas of research include the use of Arginine to treat breast cancer, where it is shown to increase the cytotoxic activity of NK and lymphokine-activated cells, and migraines.

Arginine is becoming a popular supplement in body enhancing products. Body builders take Arginine to lose weight; by helping in the metabolization of proteins, Arginine helps to reduce fat.

A new supplement, Arginine Alpha Ketoglutarate, or NO<sub>2</sub>, is becoming popular in the workout world. Formed by combining two molecules of Arginine and one molecule of alpha ketoglutarate, it is believed to increase muscle mass and strength by improving blood flow.

Arginine can be obtained through dietary sources, including meats, dairy products, soybean, white flour, wheat, oats, almonds, walnuts, coconuts, peanuts, chocolate and carob.

It is recommended that Arginine be taken in balance with other amino acids. For an adult, the daily-required dosage per kilogram of body weight is 10-12 mg, up to 15 mgs. The L—form of amino acids are closest to the natural form.



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References:\* **“Keeping Your Immune System In Top Shape”**. <http://www.nutritional-supplements-health-guide.com/benefits-of-l-arginine.html>

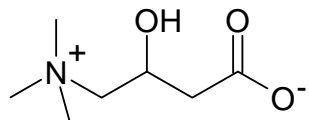
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## L-Carnitine Base



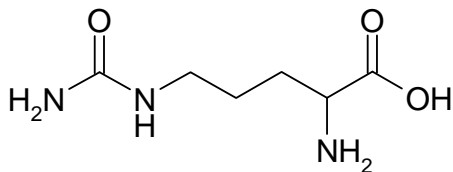
Carnitine is a compound found in all living beings. Its name is derived from the Latin word *carnus*, meaning flesh, as it is obtained from meat. It is produced primarily in the liver and kidneys from the amino acids lysine and methionine. Additionally, Vitamin C is also necessary for the synthesis of Carnitine. Living cells operate by employing Carnitine to bring compounds into and out of the mitochondria – the energy factory of cells. For example, Carnitine transports fatty acids into the mitochondria so that they can be burned to produce energy for metabolism. Thus, Carnitine is often concentrated in tissues like skeletal and cardiac muscles that use a high amount of metabolic energy.

Generally, healthy children and adults do not need to consume extra Carnitine as they can make sufficient amount to meet the needs of their bodies. However, the requirement for Carnitine might exceed its natural production in growing infants or pregnant women. Throughout aging, the amount of Carnitine in cells is found to diminish; thus, affecting metabolism in various areas of the body. Particularly, adverse effects are observed in bones which require a continuous feed of metabolic fuel so as to maintain bone mass. Administration of Carnitine is often helpful in preventing osteoporosis in the elderly and in post-menopausal women. It has also been shown that Carnitine is beneficial to improving the heart's capacity. Athletes are known to supplement their diets with Carnitine to improve muscle power and energy.

Animal products like meat, fish, poultry and milk are packed of Carnitine. Adults eating a healthy mixed diet can obtain 60 – 180 mg of Carnitine per day. Vegans get significantly less (only about 10 – 12 mg) since they avoid animal-derived foods. For both, about 60 – 80% of Carnitine from food is absorbed. It is recommended to supplement with 500 – 1500 mg of L-Carnitine per day.

Reference 1) <http://ods.od.nih.gov/factsheets/carnitine.asp>. 2) <http://www.bodybuilding-supplement-guide.com/l-carnitine.html>

## L-Citrulline



Citrulline is a non-standard amino acid derived from *citrullus*, the watermelon, and found in high concentrations in the liver. It is created in the body as a byproduct of ornithine and carbamoyl phosphate, and arginine. Citrulline is used as a supplement to enhance athletic performance and is viewed as a complement to creatine. Citrulline is believed to enhance anaerobic performance, while creatine enhances aerobic performance. However, Citrulline's effectiveness as an athletic performance enhancer is inconclusive.

In bodybuilding, Citrulline has been associated with higher energy and endurance through the creation of Arginine. In increasing energy levels, arginine is believed to metabolize nitric oxide, aiding cardiovascular function, muscle health and nutrient delivery. By substituting for Arginine, Citrulline supports the immune response.

For endurance, Citrullin Malate (CM) products are commonly sold in the sports enhancement market. Citrullin attaches to malic acid, an intermediate of the Krebs cycle, an energy-producing system within cells. Due to these many beneficial aspects of Citrulline, overall recuperation from sports activities has been shown to be quicker.

In the urea cycle, Citrulline assists in the removal of endotoxins, including lactic acid and ammonia. Endotoxins, produced through protein metabolism and intense physical activity, can damage liver cells. Its ability to detoxify ammonia removal in the liver helps reduce fatigue. Citrulline is also used in the treatment of urea disorders.

Additionally, Citrulline supplementation has been associated with a number of treatments, including for impotence, due its ability to convert into the amino acid arginine, thereby raising arginine levels. This assumes that arginine is an effective treatment for impotence. Preliminary studies have been undertaken linking Citrulline use to improved mental function in people with Alzheimer's disease.

It is recommended that Citrulline be taken in balance with other amino acids. As an athletic performance enhancer, it is sometimes taken in combination with creatine and arginine.

For an adult, a daily dosage of 6-18 grams of Citrulline is recommended.

Growing children, pregnant women, nursing mothers and those with liver or kidney disease should obtain a doctor's approval before taking Citrulline.

Treatment of diseases and disorders, including Alzheimer's, should be done under a doctor's supervision.

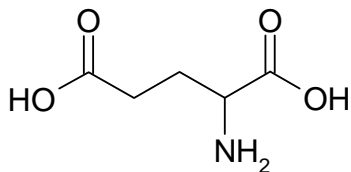
*References\*1. Bendahan D, Mattei JP, Ghattas B, et al. Citrulline/malate promotes aerobic energy production in human exercising muscle. Br J Sports Med . 2002;36:282–9.*



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\* *Callis A, Magnan de Bornier B, Serrano JJ, et al. Activity of citrulline malate on acid-base balance and blood ammonia and amino acid levels. Study in the animal and in man. Arzneimittelforschung . 1991;41:660–3.*

## L-Glutamic Acid



Glutamic Acid is an amino acid, which works in conjunction with other amino acids to perform various metabolic and neurological functions. Specifically, it acts as a neurotransmitter, it helps the body metabolize sugars and fats, and it detoxifies the body by disposing of excess nitrogen and ammonia.

Glutamic Acid has been shown to be beneficial in a wide range of bodily functions. It plays a key role in metabolism, and as such, it helps the body regulate weight, blood sugar, and energy. It also improves digestive function in general, with the potential to remedy some types of digestive disorder. It has been suggested by various studies that this nutrient aids in prostate function as well.

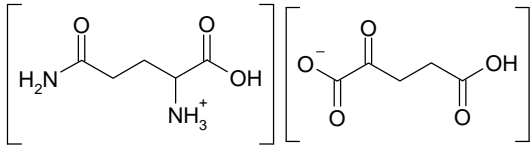
Glutamic Acid is our principle means of clearing the body of nitrogen and toxic ammonia, and in particular, detoxifying the brain of ammonia. As a neurotransmitter, glutamic acid has the potential to improve mental and cognitive functions and memory; in short, it makes us more mentally alert. Glutamic Acid also helps reduce the production of free radicals. Because of the wide range of benefits that this amino acid has, it is no exaggeration to say that it is important for the successful functioning of the body in general.

Like other amino acids, Glutamic Acid is found in a variety of animal proteins, including red meat, poultry, eggs, fish, and dairy products. It is also found in some vegetable sources, notably raw spinach and parsley.

While clinical studies have been conducted using dosage levels as low as 2 gr/day and as high as 5 gr/day, the most beneficial dosage for most people is about 8 gr/day.

*References* 1) Molecular pharmacology of glutamate transporters, EAATs and VGLUTs. 2) Zello GA, Wykes LF, Ball RO, et al. Recent advances in methods of assessing dietary amino acid requirements for adult humans. *J Nutr* 1995;125:2907

## L-Glutamine Alpha-Ketoglutarate 2:1



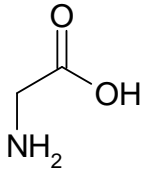
Glutamine is a semi-essential or conditionally essential amino acid. This means that the body can produce sufficient glutamine under normal circumstances. However, there are times when the body cannot do so. These include metabolic stress situations such as trauma, cancer, sepsis and burns. Under such conditions, it is very important to supplement one's diet with adequate amounts of glutamine because our body uses it for making proteins, reproducing DNA and as an alternate source of fuel for the brain. L-glutamine alpha-ketoglutarate is a dietary supplemental form of glutamine which combines alpha ketoglutaric acid with the amino acid.

Glutamine is also the most abundant amino acid in muscle tissue, providing energy to cells. Thus, when one exercises intensely, say 3 to 4 times per week, glutamine levels can plummet significantly and delay the time it takes for the muscles to recover. Glutamine is especially essential in prolonged exercise, such as marathons and triathlons. Yet, it has been shown that supplementation of L-glutamine alpha-ketoglutarate is more beneficial than administering the amino acid alone. The reason for this is that, unlike glutamine, L-glutamine alpha-ketoglutarate can bypass the gut and be shuttled directly muscle cells rather than being absorbed by the small intestines. When glutamine is stored in the muscle cell, it produces a cell volumizing effect which works synergistically with the one creatine produces. Glutamine stored in the muscle has been shown to promote muscle synthesis, have a positive effect on nitrogen balance and reduce muscle breakdown following intense physical activity.

Often sold in powder form, L-glutamine alpha-ketoglutarate can be consumed by mixing it with protein drinks. It is also sold as softgels in varying amounts. To achieve maximum effects, consume immediately prior or after a workout or athletic event.

References: (1) <http://www.nutriline.org/article/61> (2) <http://www.vitaminstuff.com/glutamine.html>

## L-Glycine



Glycine is a nonessential amino acid meaning that it is not necessary to obtain from dietary that has numerous effects in the body. It is used to help to create muscle tissue and convert glucose into energy and to prevent the breakdown of muscle by boosting the body's levels of creatine.

Glycine may also enhance the firing of nerves that stimulate muscles to contract; recent study suggests that maintaining glycine levels could prevent sports injuries, such as muscle strains and sprains.

A big percentage of collagen is composed of glycine, without glycine the body would not be able to repair damaged tissues; the skin would become damaged and wounds would never heal.

Glycine is also known as glucogenic amino acid, because it provides glucose to the body, which needs for energy and adjusts the blood sugar levels. Glycine supplementation helps treating symptoms such as fatigue, hypoglycemia, anemia, and Chronic Fatigue Syndrome (CFS).

Studies on men and women with sleep difficulties appear to show that glycine supplementation promotes deep sleep. Subjects who took three grams of glycine within an hour of bedtime reportedly fell asleep and exhibited brainwave patterns associated with deep, non-REM sleep

Glycine, an amino acid, is known to accumulate in the pineal gland of rodents during sleep,' and is believed to play an important role in "disconnecting" the brain from the body during REM (rapid eye movement)

Individuals with kidney or liver disease should not consume glycine without consulting their doctor. Taking any one amino acid supplement can cause a disruption of the citric acid or Krebs cycle, and cause a build-up of nitrogen or ammonia in the body, which makes the liver and kidneys work harder to remove waste.

References 1. Redecker P,. Evidence for microvesicular storage and release of glycine in rodent pinealocytes. *Neurosci Lett.* 2001 Feb 16;299(1-2):93-6.



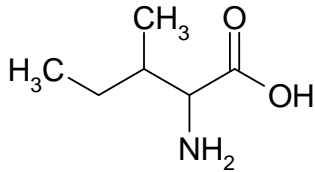
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2. Chase MH,. Evidence that glycine mediates the postsynaptic potentials that inhibit lumbar motoneurons during the atonia of active sleep. J Neurosci. 1989 Mar;9(3):743-51

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## L-Isoleucine



Isoleucine, one of three essential branched-chain amino acids (BCAAs), is not produced in the body and must be obtained through diet. Isoleucine, leucine and valine make up 70 percent of the amino acids in the body proteins, working together to maintain and repair muscle tissue and regulate blood sugar and energy.

Isoleucine is popular with body builders and athletes and is commonly found in muscle building supplements. Its supplementation has proven effective in preventing muscle deterioration and promoting tissue repair due to its anabolic effects on muscle protein synthesis, which prevent muscle protein loss. At the site of an injury, it aids blood clotting. Similarly, it is used to aid muscle and tissue recovery after surgery or trauma.

A second important function of Isoleucine is its ability to regulate blood sugar and energy levels. It is a necessary component of hemoglobin formation. As such, it is important in the treatment of high blood pressure and diabetes. Notably, recent research has found a link between a genetic defect in tRNAs, genes in the mitochondria involved in the construction of protein cells, that transport isoleucine. This genetic defect, or mitochondrial malfunction, is now being linked to hypertension, high cholesterol and low magnesium, primary contributors to heart and stroke disease.

Isoleucine deficiency is typically found in protein deficient diets. Symptoms can be similar to those from hypoglycemia and may include fatigue, headaches, depression and dizziness. An inability to metabolize leucine, valine and isoleucine is known to contribute to Maple syrup urine disease (MSUD), a condition caused by the buildup of metabolites in the urine.

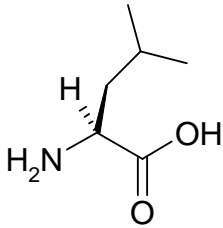
Isoleucine, which is obtained through dietary sources, can be found in meats, fish, dairy products (dairy foods), soy protein, grains (lentils, chickpeas), nuts (peanuts, almonds, and sesame seeds) and vegetables.

It is recommended that Isoleucine be taken with the two other BCAAs, valine and leucine, at 2 milligrams of leucine and valine for each 1 milligram of isoleucine, or a 2:1:2 ratio of valine, isoleucine and leucine, respectively. For an adult, the daily required dosages per kilogram of body weight is 10-12 mg.

The metabolism of BCAAs may be improved by combining them with other nutrient supplements, such as B12 and biotin.



## L-Leucine



Leucine is one of the three essential branched-chain amino acids (BCAAs), which together with valine and isoleucine accounts for 15-25% of our protein intake. Leucine's unique role in promoting metabolic regulation has a number of beneficial effects. By promoting protein synthesis, Leucine helps in the maintenance and development of muscles. In addition, Leucine improves glucose and insulin tolerance by producing the amino acid alanine, which aids blood glucose control by producing glucose in the liver. The impact of Leucine on these metabolic regulatory functions is proportional to dietary intake.

Leucine has a number of positive effects on exercise and diet. It is valued by bodybuilders for its ability to develop muscles and produce energy during exercise. In dieting, Leucine helps burn calories by changing the metabolism of amino acids to increase the amount of energy expended. Notably, while increased Leucine intake may change body composition, it has been shown to spare lean body mass while controlling insulin and glucose levels. With the two other BAAs, isoleucine and valine, Leucine is used to treat chronic liver disease, including hepatic encephalopathy, a form of liver disease found in alcoholics. Although rare, Leucine deficiency can result in hypoglycemic symptoms, including fatigue, headaches, and dizziness. An inability to metabolize leucine, valine and isoleucine is known to cause Maple syrup urine disease (MSUD).

Leucine is found in meat, legumes, soy beans, nuts, brown rice and whole wheat. High leucine content is found in whey isolate and casein (milk). It is recommended that a daily required dosage per kilogram of body weight of 10 – 18 g of Leucine is taken through food and supplementation. For exercisers taking leucine supplements, 20-40 g of whey protein is recommended before and after workouts.

The metabolism of BCAAs may be improved by combining them with other nutrient supplements, such as B12 and biotin.

High amounts of amino acids may disrupt liver and kidney function, cause headaches, skin hypersensitivity, and hallucinations, and increase the amount of ammonia in the body.



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*References:*\* **“The secret of 'muscular' old age”** Electronic source, 2007.  
<http://news.bbc.co.uk/2/hi/health/4502862.stm>

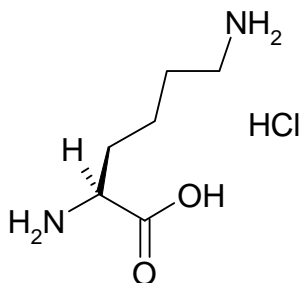
\* **“Leucine: Amino muscle builder- Advanced Nutrition”** Electronic source,  
([http://findarticles.com/p/articles/mi\\_m0KFY/is\\_5\\_21/ai\\_103376715/pg\\_1](http://findarticles.com/p/articles/mi_m0KFY/is_5_21/ai_103376715/pg_1))

\* Burning extra calories with a futile protein cycle, <http://www.newsrx.com/health-article>

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## L-Lysine Mono HCL



Lysine is an essential amino acid, meaning that it is vital to human health but cannot be manufactured by the body. Due to this reason, lysine must be obtained from food or supplements.

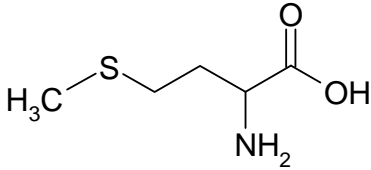
In the body, lysine is used to produce acetyl-CoA, a significant molecule used in energy production. Lysine also helps the body absorb and conserve calcium. It plays a crucial role in the formation of collagen, a substance critical for bones and connective tissues including skin, tendon and cartilage. More importantly, lysine helps boost the immune system by aiding the production of antibodies.

If one is deficient in lysine, kidney stones and other health problems can develop. These may include fatigue, nausea, dizziness, loss of appetite, bloodshot eyes, slow growth, anemia, and reproductive disorders. However, it is extremely rare to obtain an insufficient amount of lysine through one's diet as it is found in many common foods. Cereal grains contain little lysine but legumes (beans, peas and lentils) provide a plentiful amount. Meat, cheese, eggs, nuts and soybeans are also good sources of lysine. The browning process, or caramelization, in foods like pastries, doughnuts and cookies involves the linking of lysine and sugar. When linked together, it makes lysine difficult for the body to absorb. As a result, a diet high in baked goods that contain a lot of simple sugars may lead to a deficiency in lysine.

The human nutritional requirement of lysine is 1 – 1.5g daily. Regardless of whether your diet has enough or is lacking in lysine, a healthcare practitioner may recommend lysine supplements. These cases are often for the treatment of herpes, shingles or osteoporosis. Certain forms of lysine or lysine-bound anti-inflammatory medications may also be administered to relieve headaches, period pains or pain after surgery.

References(1) <http://en.wikipedia.org/wiki/Lysine> (2)<http://www.umm.edu/altmed/articles/lysine-000312.htm>

## L-Methionine



Methionine is a sulfur-containing, protein-generating amino acid. First isolated by scientists in 1922, methionine is one of the essential amino acids, meaning that the body cannot generate it, and must obtain it from food sources or supplements. Methionine is used primarily in digestion and metabolism, but, like other amino acids, it has the potential to affect multiple and diverse body systems. For this reason, a methionine deficiency can have far-reaching implications; it can affect the mental functions and skin as well as internal organ systems.

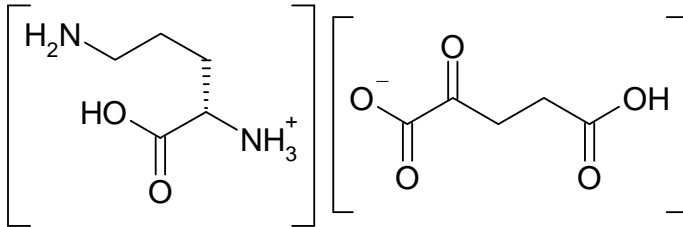
Extensive clinical studies have identified the diverse benefits of methionine, as well as several potentially beneficial effects that have yet to be proven. We know that methionine aids in digestion, helps break down fat in the body, and detoxifies the liver. Without sufficient methionine, fat accumulates in the arteries much more readily, potentially leading to cardiovascular disease. Methionine is also a powerful antioxidant, because the sulfur it contains de-activates free radicals. All of these proven effects demonstrate the important role methionine plays in maintaining good health in the long term. Adequate methionine levels alleviate or prevent many of the conditions that commonly increase with aging, such as heart disease. Conversely, deficiencies in methionine can lead to a variety of metabolic and other disorders.

Methionine is found in most kinds of meat and fish, as well as several vegetarian sources. Some nuts and seeds, in particular sesame seeds and Brazil nuts, are rich in this nutrient. It is also plentiful in spinach, potatoes, garlic, lentils and cooked corn. Eggs are another reliable source of methionine.

The Recommended Daily Dosage of methionine is 12 mg per kilogram of body weight per day.

*References* 1) Nelson, D. L.; Cox, M. M. "Lehninger, Principles of Biochemistry" 3rd Ed. Worth Publishing: New York, 2000. ISBN 1-57259-153-6. 2) <http://www.vitamins-supplements.org/amino-acids/methionine.php>

## L-Ornithine Alpha-Ketoglutarate



Ornithine alpha-ketoglutarate (OKG), a nonessential amino acid produced in the body, is formed from a combination of two molecules of ornithine and one molecule of alpha-ketoglutarate (AKG), a glutamine precursor. Through a balanced and healthy diet, the body can produce sufficient supplies of OKG, although it is also taken as a dietary supplement.

OKG's strong healing properties are beneficial in a number of treatments, including post-surgery, burns and malnourishment. OKG is effective in treating severe illness and injury due to its ability to block the catabolic effects of hormones that break down muscles and tissues while directly stimulating anabolic activity. Its role in helping to build up muscle has made it a popular sports supplement. Arginine and ornithine combined have also been found to improve muscle mass. In addition, OKG is known to regulate liver function and has shown promise in the treatment of hepatic encephalopathy, a liver cirrhosis.

Insufficient levels of OKG may result in immune and gastrointestinal dysfunctions, birth defects and delayed maturation. A number of conditions may arise that negatively affect the natural production of OKG, including rare genetic disorders and high stress and trauma conditions that impair the synthesis of OKG.

OKG can be obtained through high protein foods, including meats, dairy products, soybeans, white/wheat flour, gelatin, wheat, oats, coconuts, peanuts, walnuts, chocolate and carob.

It is recommended that OKG be taken in balance with other amino acids. For an adult, the daily required dosage is 5 to 10 grams. Doses higher than 10 grams daily may result in adverse reactions, such as nausea and abdominal cramps. The metabolism of amino acids may be improved by combining them with other nutrient supplements, such as B6, zinc, manganese and magnesium.

*References:*\* "Donati L, Ziegler F, Pongelli G, et al. **Nutritional and clinical efficacy of ornithine alpha-ketoglutarate in severe burn patients.** Clin Nutr. 1999;18:307–311

\* "Czernichow B, Nsi-Emvo E, Galluser M, et al. **Enteral supplementation with**



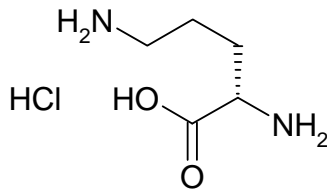
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**ornithine alpha ketoglutarate improves the early adaptive response to resection.**  
Gut. 1997; 40:67-72

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## L-Ornithine



Ornithine, a nonessential amino acid, is produced in the body in the form of Arginine. Through a balanced and healthy diet, the body can produce sufficient supplies of Ornithine, although it is also taken as a dietary supplement.

Ornithine is known to be effective in increasing the rate of fat burning, preventing heart disease and arthritis, aiding wound healing, and reducing cholesterol.

By stimulating hormones, such as insulin and growth hormone, Ornithine regulates immune system and liver function while promoting the metabolization of body fat. The stimulation of growth hormone in the pituitary has also been shown to aid wound healing. In the prevention of heart disease, Ornithine reduces cholesterol and fatty deposits in arteries.

Ornithine is metabolized into Arginine, and vice versa, in the urea cycle. While these amino acids have similar effects, Ornithine is twice as effective.

Studies have shown that equal parts of Arginine and Ornithine taken daily can increase total strength and lean body mass.

Insufficient levels of Ornithine may result in birth defects and delayed maturation. A number of conditions may arise that negatively affect the natural production of Ornithine, including rare genetic disorders and high stress and trauma conditions that impair the synthesis of Ornithine.

Ornithine can be obtained through dietary sources, including meats, dairy products, soybeans, white/wheat flour, gelatin, wheat, oats, coconuts, peanuts, walnuts, chocolate and carob.

It is recommended that Ornithine be taken in balance with other amino acids. For an adult, the daily required dosage is 500 mg to 2 grams. Doses higher than 10 grams daily may result in adverse reactions, such as nausea and abdominal cramps. To promote healing, two parts Arginine and one part Ornithine is suggested. The metabolism of amino acids may be improved by combining them with other nutrient supplements, such as B6, zinc, manganese and magnesium.



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High levels of Ornithine may result in seizures and gyrate atrophy, resulting in diminished vision, cataracts, and night blindness. Treatment of diseases with Ornithine should only be done under a doctor's supervision.

References:\* Balch, James F. and Phyllis A. Balch,, Prescription for Nutritional Healing: A to Z, Guide to Supplements, Avery Publishing 2000.

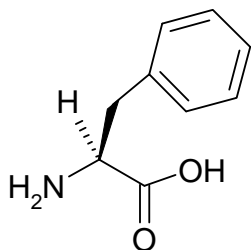
Braverman, Eric P., The Healing Nutrients, Within, Keats Publishing, 1997.

Sahley, Billie J. and Katherine M. Birkner, Heal, with Amino Acids, Pain & Stress Publications,2000

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## L-Phenylalanine



L-phenylalanine is one of the essential amino acids, meaning that the body is not capable of producing it, and we need to obtain it from food sources. Like other amino acids, L-phenylalanine is one of the building blocks for proteins. It is converted to tyrosine, another amino acid, and is part of the process of normal growth, particularly the growth of muscles.

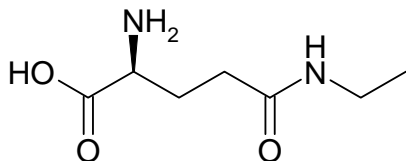
L-phenylalanine drives growth and synthesizes muscle protein. Accordingly, it is an important nutrient for anyone who is trying to enhance fitness, muscle development or growth. However, there is considerable evidence of other benefits as well. For example, L-phenylalanine is sometimes used as a treatment for vitiligo, a skin disorder that causes white, non-pigmented patches to appear on the skin. It enhances mental energy and sharpness as well, and can also improve memory, allowing one to retain full mental functioning during aging.

Moreover, although further studies are still being conducted it is suspected that L-phenylalanine might be of use in treating depression. This is because, as it metabolizes, it produces the neurotransmitters noriepinephrine and dopamine, which are both known to have an anti-depressant effect. If the current studies in the use of L-phenylalanine for depression prove conclusive, it will be of enormous benefit to sufferers, allowing them to avoid the side-effects of pharmaceutical treatments.

L-phenylalanine is found in many protein-rich foods, including meat, fish, poultry, eggs, dairy products and beans. L-phenylalanine may be beneficial in doses varying from 75 mg to 1500 mg per day. Exceeding 1500 mg except under a doctor's supervision is not recommended.

*References* 1) Heller B. Pharmacological and clinical effects of D-phenylalanine in depression and Parkinson's disease. In: Mosnaim AD, Wolf ME, eds. Noncatecholic Phenylethylamines . Part 1. New York, NY: Marcel Dekker; 1978:397-417. 2) <http://www.supplementinfo.org>.

## L-Theanine



Commonly found in tea, theanine is an amino acid that can enter the brain and modulate signals in the central nervous system. Studies have shown that theanine can reduce both mental and physical stress because it promotes alpha brain waves, a wave pattern which allows you to be relaxed yet alert. Furthermore, theanine increases the levels of dopamine in the brain. Dopamine is a neurotransmitter and hormone that is associated with one's pleasure, often produced during times such as eating and kissing. An increased level of dopamine offers a feeling of well-being.

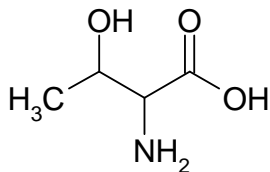
Another benefit of theanine is that it enhances concentration, improving the ability to learn and remember. This is why scholars drink tea during their studying time. Theanine works by relaxing your mind and helping you focus. Not only is it very effective at times when you are stressed, it also promotes uninterrupted, restful sleep because it calms the mind down. In addition, when taken with caffeine, theanine can improve cognition.

It is widely known that green tea can lower blood pressure and reduce cholesterol because of polyphenols. Also found in green tea, theanine can bring down blood pressure in those who are hypertensive but will not affect those who have a healthy blood pressure. It can also better your heart's health by cutting bad cholesterol. A recent study also showed that cancer patients who use theanine supplements were able to inhibit the growth of tumors and bring the effects of anti-cancer drugs to their maximum due to theanine's relaxing abilities. Other benefits of theanine include immunity boost, aiding in weight loss and lightening menstrual pain.

Based on clinical results, a dose of 50 – 200mg of theanine is most effective. Individuals who are more stressed may increase their dosage by 100mg but at no more than 600mg in a six hour period. The FDA recommends a maximum dose of 1,200mg of theanine daily.

References: (1) <http://www.amazing-green-tea.com/theanine-health-benefits.html>  
(2) [http://web-us.com/l-theanine\\_anxiety\\_reducer.htm](http://web-us.com/l-theanine_anxiety_reducer.htm)

## L-Threonine



As an essential amino acid, threonine is indispensable to one's health but it cannot be made in the human body. Because of this, it is important to obtain threonine from dietary sources as it supports normal growth and the well balance of protein in the body.

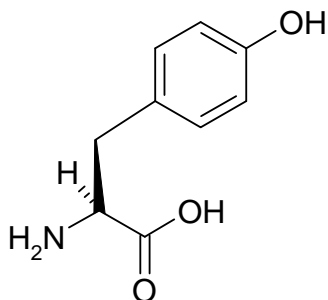
Threonine boosts the immune system since it supports the making of antibodies. It is also used in the body to manufacture two other amino acids, glycine and serine, which are necessary to make collagen, elastin and muscle tissue. Threonine is found in high amounts in the heart as it maintains the strength and elasticity of connective tissues and muscles. Recent research indicates that the administration of threonine after injury or trauma may speed up the recovery.

Threonine plays a key role in the regular functions of the liver and central nervous system. The liver is mainly responsible for storing sugar, producing protein and detoxifying our entire body. However, without sufficient threonine, the liver is unable to digest fats, causing fatty build up and eventually liver failure. Amyotrophic Lateral Sclerosis (ALS) is a progressive, often fatal, disease causing muscle weakness throughout the entire body and ultimately the lost of control over voluntary movements. Threonine is supplemented to treat ALS as it increases glycine levels in the central nervous system, thus reducing the symptoms. Research shows that 7.5g of threonine taken daily by patients can decrease the twitching of muscles.

A balanced diet, including meat, dairy products, mushrooms and leafy vegetables, will guarantee no threonine deficiency. Vegetarians or vegans, on the other hand, should consider supplementing their diet with threonine because meat is the best source of the amino acid. The standard dose of threonine is 100 – 500 mg daily. However, exceeding the recommended dose may upset the liver and cause the formation of excess urea, leading ammonia toxicity in the body.

*References:* (1) <http://www.healthvitaminsguide.com/aminoacids/threonine.htm>,  
(2) <http://www.vitaminstuff.com/amino-acid-threonine.html>  
(3) [http://en.wikipedia.org/wiki/Amyotrophic\\_lateral\\_sclerosis](http://en.wikipedia.org/wiki/Amyotrophic_lateral_sclerosis)

## L-Tyrosine



Tyrosine is a natural amino acid used to build structural proteins and enzymes. Since it is difficult to obtain recommended amounts of L-tyrosine through natural dietary sources, supplements are recommended. L-tyrosine supports the nervous system by producing several compounds in the body that affect the brain and nerve cells, including epinephrine, norepinephrine and dopamine.

Recent research is focused on the effect of Tyrosine on neurotransmitters--the nerve impulses that influence mental mood and alertness. As a result, Tyrosine has been shown to have a positive effect on mental alertness, memory, and depression.

Specifically, L-tyrosine supports the production of the hormone norepinephrine in the brain. A lack of norepinephrine can cause mood problems, such as hyperactivity, depression and substance abuse. Therefore, L-tyrosine supplementation can play a role in treating these disorders by recharging the depleted nervous system with neurotransmitters. L-tyrosine is being used in the treatment of cocaine addiction. L-tyrosine has been used to control appetite and reduce the symptoms of allergies.

A deficiency of L-Tyrosine can impair the body's ability to produce the neurotransmitters that affect mental mood and alertness. This can result in mood disorders, such as depression and hyperactivity.

Tyrosine can be found in meats, eggs and dairy products.

It is recommended that L-tyrosine be taken in balance with other amino acids. Since the body can make L-tyrosine out of L-phenylalanine, its precursor, the amount of L-phenylalanine in the body also determines the level of supplementation required.

For an adult, in the treatment of depression, daily dosages of 850 milligrams of L-tyrosine with B-6 is recommended. For those under 100 pounds, a daily dosage of 500 milligrams is recommended.

Growing children, pregnant women, nursing mothers and those with cancer should obtain a doctor's approval before taking L-tyrosine. Treatment of mood disorders with L-tyrosine should be done under a doctor's supervision.

*References\** Baumel, Syd. *Dealing With Depression Naturally*. New Canaan, CT: Keats Publishing, Inc., 1995.

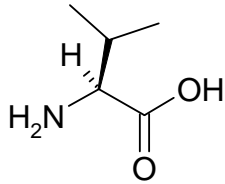
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*\*Blum, Kenneth, Ph.D. Handbook of Abusable Drugs. New York, NY: Gardner Press, Inc., 1984.*

## L-Valine



Valine is an essential amino acid that helps stimulate the central nervous system and promote proper mental functioning. A branched-chain amino acid (BCAA), it is found in fibrous protein abundant in bones, cartilage and other connective tissues, and in high concentration in muscle tissue. Together with the other BCAAs, isoleucine and leucine, Valine works to promote normal growth, repair tissues, regulate blood sugar, and provide the body with energy.

Valine works to maintain muscle tissue and the store of glycogen, promote protein synthesis, serve as substrates for gluconeogenesis and provide energy to skeletal muscles during times of stress. In treatments, valine sometimes is used in the management of burns and hepatic encephalopathy. They are also applied in trauma treatment due to their ability to promote protein synthesis and prevent muscle catabolism.

Specifically, Valine contributes to stress reduction, energy and muscle metabolism, tissue repair and the synthesis of glucose in the liver. In treatments, Valine has been found useful in treating muscle, mental and emotional disorders, insomnia, nervousness, ammonia toxicity and amino acid deficiencies from drug addiction.

Valine deficiency can result in a deterioration of muscle function and mental health, insomnia and skin hypersensitivity. Symptoms may include a higher susceptibility to allergens, loss of balance and a deterioration in muscle function. An inability to metabolize valine, leucine and isoleucine is known to cause Maple syrup urine disease (MSUD).

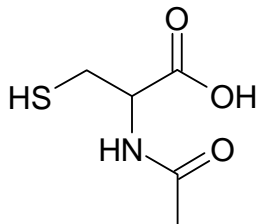
Valine, which can only be obtained through dietary sources, can be found in meats, fish, dairy products, grains, soy protein, peanuts and vegetables, such as mushrooms.

Daily required dosages per kilogram of body weight are as follows: Adults 5 mg, Young adults 23 mg, Children 5 mg, and Infants 89 mg. The metabolism of BCAAs may be improved by combining them with other nutrient supplements, such as B12 and biotin.

### *References:*

“L-Valine” Electronicsource. <http://www.vitaminstuff.com>, \* “Valine” Electronic source. <http://www.vitamins-supplements.org> \* “Branched-Chain Amino Acid” Electronic source <http://www.pdrhealth.com/>

## N-Acetyl L-Cysteine



N-acetyl L-cysteine (NAC) is a form of the common amino acid cysteine that is most easily absorbed into the body. As an antioxidant supplement, NAC is used by the body to make glutathione, a natural antioxidant enzyme that allows the immune system to fight toxins and diseases. Without glutathione, one's immune system is weak and has little defense. Yet if that is the case, why not consume more glutathione directly? The reason is that NAC can be transported into cells much more effectively than glutathione. What's more, an ample amount of NAC in the body can stimulate the production of glutathione if it is needed in the cell. This is more preferred because too much glutathione is not healthy.

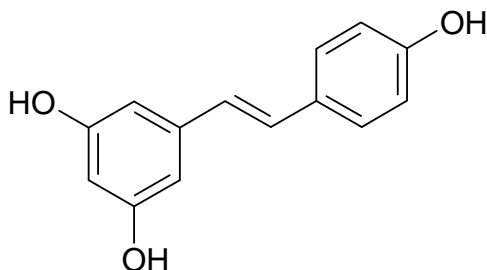
There are many benefits of NAC supplementation due to its detoxifying effects. These include prevention and treatment of cancer, heavy metal poisoning, smoker's cough, bronchitis, alcohol poisoning, heart disease and cystic fibrosis. NAC is also widely used to treat patients with an excess of acetaminophen, the active ingredient in Tylenol.

Even though it is not a diagnostic trait, but a low count of T4 white blood cells is almost always the case for those who are later diagnosed with AIDS. Because cysteine has been shown to stimulate the production of T4 cells, many studies are now taking place to investigate the effects of NAC on those with AIDS.

There is no Recommended Dietary Allowance for NAC since cysteine is made in the body and found in many common foods such as meat, eggs, wheat, broccoli, garlic, onions and red peppers. However, supplementing one's diet with NAC can improve the immune system and detoxify the body.

References: (1) <http://www.vitaminstuff.com/acetylcysteine.html>  
(2) <http://juvenon.com/jhj/vol4no10.htm>

## Resveratrol



Resveratrol is a polyphenol, a component of some common plants and plant foods, which has lately been the subject of extensive clinical study due to capacity to protect against disease, aging and injury.

Resveratrol has properties that protect against the common diseases of aging, including diabetes, heart disease, some cancers, and even Alzheimer's Disease. The nutrient has been found to mimic the benefits of calorie restriction. Simply reducing calories has multiple benefits as we age; it prevents insulin resistance and therefore diabetes, and prevents the formation of free radicals. However, for most people in our society, a low calorie diet is difficult to maintain over the long term. Supplementation with resveratrol has many of the same benefits, counteracting the effects of a high calorie diet and boosting the life span of cells.

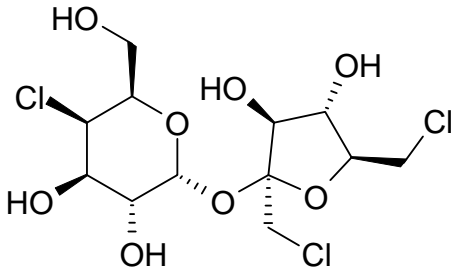
In addition, resveratrol inhibits the growth of certain cancers, notably colorectal and prostate cancer; promotes the health of blood vessel tissue lining, as well as of the heart itself, and activates proteins in the cell mitochondria.

Resveratrol was first discovered in red wine and grapes, but it is present in a number of other plants and plant food as well. For example, some berries, especially blueberries and bilberries, are good sources of resveratrol. Peanuts also contain the nutrient, as do some pine, and the roots and stalks of the Japanese knotweed.

Up to 300 mg/ day of resveratrol is considered safe, but for individuals taking certain medications, the safe dose is somewhat lower. 100 mg/ day is safe and beneficial for all.

*References* 1) Farina A, Ferranti C, Marra C (2006). "An improved synthesis of resveratrol". *Nat. Prod. Res.* 20 (3): 247-52. 2) Bertelli AA, Gozzini A, Stradi R, Stella S, Bertelli A (1998). "Stability of resveratrol over time and in the various stages of grape transformation"

## Sucralose



Sucralose is a synthetic sweetener that is currently used to replace sugar in a number of food products. Discovered in 1976, Sucralose has been tested and safety approved in 80 countries worldwide.

Sucralose is actually derived from sugar; it is synthesized through the selective chlorination of the sugar molecule. Specifically, chlorine molecules are substituted for 3 hydroxyl groups that form the naturally occurring sugar molecule. The result is a very sweet substance – about 600 times sweeter than sucrose – which is remarkably safe and has no aftertaste, but, because it is not metabolized by the body, has no calories.

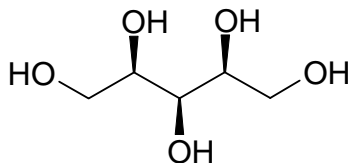
Currently, Sucralose is used in a wide variety of food products, including soft drinks and breakfast bars. It has several unique properties which make it suitable for cooking, canning or baking. Sucralose is, perhaps, the safest synthetic sweetener.

Because of its high safety rating and flexible use, Sucralose is of great benefit to those wishing to consume less sugar in order to enhance health and cut calories. Sucralose is most common in prepared food products such as candy and breakfast bars. However, the fact that it is heat stable also makes it suitable for cooking, canning and baking. It is conceivable that Sucralose may be a satisfactory substitute for sugar in every capacity that sugar is currently used.

Because Sucralose is derived from sugar, its taste is very natural, not at all ‘chemical’, and it has no unpleasant aftertaste. In short, using Sucralose literally enables people to consume ‘sugar’ without the health detriments normally associated with sugar consumption, such as weight gain, tooth decay, and the risk of diabetes.

*References 1) Facts About Sucralose, American Dietetic Association, 2006. 2) Artificial Sweeteners: No Calories...Sweet FDA Consumer; Jul/Aug2006, Vol. 40 Issue 4, p27-28, 2p, 1c.*

## Xylitol



Xylitol is a natural sweetener found in the fiber of fruits, including strawberries, raspberries and plums, that has proven to promote positive dental oral health. Our bodies produce up to 15 grams of xylitol through the metabolism of foods high in xylitol. A white crystalline substance that looks and tastes like sugar, a teaspoon of xylitol contains no carbohydrates and has 9.6 calories versus 15 calories in sugar.

Xylitol inhibits the growth of bacteria that causes gum and tooth decay by inhibiting the growth of *Streptococcus mutans*. Furthermore, it has a remineralizing effect and reduces the buildup of plaque. It can prevent tooth decay, reverse existing dental caries and provide preventative protection. Under the US Food and Drug Administration, xylitol-based products may make the claim that they do not promote dental caries.

Additionally, Xylitol inhibits the growth of *Streptococcus pneumoniae*, which is the cause of ear infections. It has been found to prevent oral infections of *Candida* yeast while glucose and sucrose have been shown to promote *Candida* yeast infections.

Xylitol, which has no aftertaste, is becoming more popular as a natural sweetener. Unlike many sugars, it does not contribute to tooth decay, but rather prevents it, nor does it raise insulin levels. It produces 40 percent less food energy than sugar and is absorbed more slowly. It is, therefore, becoming popular in diabetic food.

Xylitol is found in fruits, vegetables, mushrooms, cereal grains, and hay and corn cobs. It is produced in large quantities from birch wood chips. Xylitol is increasingly being used in toothpaste, gum and candies as a sweetener and cavity preventer. It can also be found in nasal washes used in the treatment of ear infections.

For cavity prevention, a daily dose of 4 to 10 g of Xylitol is recommended. A higher daily dosage of 8 to 10 g has been recommended for ear infections.

Xylitol, as a sugar alcohol, can act as a mild laxative. Daily dosages higher than 30 g may cause stomach problems and diarrhea..

*References\* Hildebrandt GH,. Maintaining mutans streptococci suppression with xylitol chewing gum. J Am Dent Assoc . 2000;131:909–916.*

*\* Uhari M, Kontiokari T, Niemela. A novel use of xylitol sugar in preventing acute otitis media. Pediatrics . 1998;102:879–884.*



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