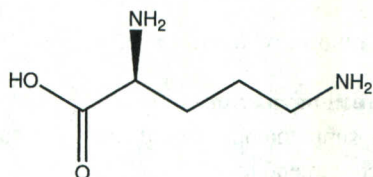


L-Ornithine

DESCRIPTION

L-Ornithine is a nonprotein amino acid. It is used in the body in the biosynthesis of L-arginine, L-proline and polyamines. L-Ornithine is a basic amino acid, positively charged at physiological pH. It is also known as alpha,delta-diaminovaleric acid and 2,5-diaminopentanoic acid. The molecular formula of L-ornithine is $C_5H_{12}N_2O_2$, and its molecular weight is 132.16 daltons. The structural formula is:



L-Ornithine

L-Ornithine is used as a nutritional supplement principally for its putative anabolic activity. There is little evidence to support this use. However, a derivative of L-ornithine called ornithine alpha-ketoglutarate or OKG (see Ornithine Alpha-Ketoglutarate) may, under certain conditions, have immunomodulatory and anticatabolic and/or anabolic actions.

ACTIONS AND PHARMACOLOGY

ACTIONS

L-Ornithine has putative anabolic, immunomodulatory and wound-healing activities.

MECHANISM OF ACTION

L-Ornithine may at very high doses—around 30 grams—stimulate the pituitary release of growth hormone by virtue of its metabolism to L-arginine (see L-Arginine).

Burn injury and other traumas affect the status of L-arginine in the various tissues of the body. *De novo* synthesis of L-arginine during these conditions is probably not sufficient for normal immune function, nor for normal protein synthesis. Under these conditions, L-ornithine may have immunomodulatory and wound-healing activities, again, by virtue of its metabolism to L-arginine.

PHARMACOKINETICS

Following ingestion, L-ornithine is absorbed from the small intestine via a sodium-dependent active transport process. The transport system for L-ornithine is shared with L-arginine, L-lysine and L-cystine. L-ornithine is transported via the portal circulation to the liver where it undergoes extensive metabolism to L-arginine, polyamines and proline, among other metabolites. L-Ornithine that is not metabolized in the liver is distributed by the systemic circulation to the various cells of the body.

INDICATIONS AND USAGE

It is claimed that ornithine has anabolic effects and improves athletic performance, that it has wound-healing effects and is immuno-enhancing. There is little support for these claims. There is at least preliminary evidence, however, that the better-studied ornithine alpha-ketoglutarate may have some of these activities. Inasmuch as ornithine is metabolized to arginine, which also demonstrates some of these effects, it is possible that ornithine, when more thoroughly studied, might exhibit some similar effects. See Arginine and Ornithine Alpha-Ketoglutarate.

RESEARCH SUMMARY

In one double-blind, placebo-controlled study, a combination of 1 gram of arginine and 1 gram of ornithine daily, used in conjunction with a high-intensity strength-training program over a five-week period, increased total strength and lean body mass in adult males, compared with controls. Most trials using ornithine alone, however, have reported no significant anabolic effects. Most of these studies have failed to show that ornithine supplementation has any significant effect on insulin secretion or human growth hormone levels in bodybuilders. There is apparently only one study reporting that ornithine increased growth hormone levels in bodybuilders, and this study used a very high dose of the supplement (13 grams daily). Numerous gastrointestinal side effects were associated with this dosage.

CONTRAINDICATIONS, PRECAUTIONS, ADVERSE REACTIONS

CONTRAINDICATIONS

L-Ornithine is contraindicated in those with a deficiency of ornithine-delta-aminotransferase. This is a genetic disorder resulting in gyrate atrophy of the choroid and retina and progressive blinding chorioretinal degeneration. It is rare.

L-Ornithine is also contraindicated in those hypersensitive to any component of an ornithine-containing supplement.

PRECAUTIONS

Pregnant women and nursing mothers should avoid L-ornithine supplementation.

ADVERSE REACTIONS

Doses higher than 10 grams daily may cause such gastrointestinal symptoms as nausea, abdominal cramps and diarrhea.

DOSAGE AND ADMINISTRATION

Those who use L-ornithine take doses of 500 milligrams to 2 grams, usually before bedtime and on an empty stomach. Some combine L-ornithine with similar doses of L-arginine.

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L-Phenylalanine

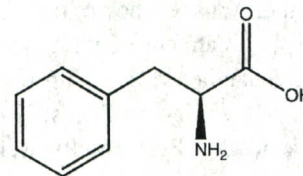
DESCRIPTION

L-phenylalanine is a protein amino acid. It is classified as an essential amino acid because the body requires a dietary source of the amino acid to meet its physiological demands. L-phenylalanine is found in proteins of all life forms. Dietary sources of the amino acid are principally derived from animal and vegetable proteins. Vegetables and juices contain small amounts of the free amino acid. The free amino acid is also found in fermented foods such as yogurt and miso. The alternative sweetener aspartame is a dipeptide of L-phenylalanine, as is the methyl ester, and L-aspartic acid.

In addition to being involved in protein synthesis, L-phenylalanine is the precursor of L-tyrosine. The conversion of L-phenylalanine to L-tyrosine is via the enzyme L-phenylalanine hydroxylase. It is this enzyme that is virtually absent in those with the inborn error of metabolism

phenylketonuria (PKU). L-tyrosine produced from L-phenylalanine is a precursor in the synthesis of the neurotransmitters norepinephrine and dopamine, among other reactions. L-phenylalanine is marketed as a nutritional supplement and used by some for its putative antidepressant activity.

L-phenylalanine is also known as beta-phenylalanine, alpha-aminohydrocinnamic acid, (S)-2-amino-3-phenylpropanoic acid and alpha-amino-beta-phenylpropionic acid. It is abbreviated as either Phe or by its one-letter abbreviation F. The molecular formula of L-phenylalanine is $C_9H_{11}NO_2$, and its molecular weight is 165.19 daltons. L-phenylalanine is an aromatic amino acid with the following structural formula:



L-phenylalanine

ACTIONS AND PHARMACOLOGY

ACTIONS

L-phenylalanine has putative antidepressant activity. It may also, when used in conjunction with UVA irradiation, have antivitaligo activity.

MECHANISM OF ACTION

The mechanism of L-phenylalanine's putative antidepressant activity may be accounted for by its precursor role in the synthesis of the neurotransmitters norepinephrine and dopamine. Elevated brain norepinephrine and dopamine levels are thought to be associated with antidepressant effects.

The mechanism of L-phenylalanine's possible antivitaligo activity is not well understood. It is thought that L-phenylalanine may stimulate the production of melanin in the affected skin.

PHARMACOKINETICS

Following ingestion, L-phenylalanine is absorbed from the small intestine by a sodium dependent active transport process. L-phenylalanine is transported from the small intestine to the liver via the portal circulation. In the liver, L-phenylalanine is involved in a number of biochemical reactions, including protein synthesis, the formation of L-tyrosine and oxidative catabolic reactions. L-phenylalanine that is not metabolized in the liver is distributed via the systemic circulation to the various tissues of the body, where it undergoes metabolic reactions similar to those that take place in the liver.

INDICATIONS AND USAGE

L-phenylalanine may be helpful in some with depression. It may also be useful in the treatment of vitiligo. There is some