

BCAA, Branch Chain Amino Acids for Muscle and Body Fitness

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The branched chain amino acids include leucine, isoleucine and valine. BCAAs are essential amino acids. They are not synthesized in man and consequently must be obtained from foods. The BCAA's comprise up to 35% of muscle proteins and make up about 50% of the dietary protein amino acids. The BCAA's serve as a source of energy in the muscles, giving rise to alanine and glutamine for conversion by the kidney and liver to glucose. BCAA's appear to play a role in amino acid produced metabolism. They are especially involved in stress reactions, energy and muscle metabolism. BCAAs are unique because the skeletal muscles use them directly as an energy source and they promote protein synthesis. The BCAA's have been used in recovery from trauma, surgery, sepsis, burns, psychological stress and in diabetic regulation. These stressors increase amino acid utilization up to four fold.

The BCAAs are similar structurally, but have different metabolic routes. Leucine solely goes to fats, valine solely to carbohydrates and isoleucine to both. A valine deficiency appears as neurological defects in the brain. Muscle tremors mark an isoleucine deficiency. Stress states such as infections, trauma, surgery, fever, cirrhosis and starvation require proportionally more leucine than with valine or isoleucine. Diseases such as hepatitis, cirrhosis, hepatic coma or liver disease lower the levels of BCAA. BCAAs as well as other amino acids are commonly fed intravenously to chronically ill patients. The BCAAs, particularly leucine, stimulate protein synthesis, increase the reutilization of other amino acids in many organs, and decrease protein breakdown. For the BCAA's to be properly utilized and metabolized B6, zinc and pantothenic acid must be present.

Leucine is an essential amino acid for muscle growth and development. Low plasma levels indicate a potential muscle catabolism, while high levels are a result of muscle tissue breakdown. The BCAA's, but

especially leucine, actually stimulates muscle protein synthesis while inhibiting protein breakdown. No other amino acids are capable of this effect. Leucine is important in healing and stimulates insulin release. P5'P, the biological form of B6, must be present for proper leucine metabolism.

Low plasma levels of isoleucine usually indicates a potential chronic deficiency state of isoleucine. This is experienced as low blood sugar or hypoglycemia and/or loss of muscle mass or inability to build muscle mass.

As stress rises, total caloric intake needs to increase, primarily due to increased protein requirements. Stress causes proteins to break down rapidly, and increases amino acid utilization three to four fold. About 30% of the diet should be protein or amino acids when the body is under severe stress. But when taken in supplement form, BCAA decreases the rate of amino acid and protein breakdown. More BCAA and B6 or P5'P (Pyridoxal 5' phosphate) are needed as stress or disease accelerates.

Utilization of the BCAAs by athletes, especially weight lifters, increases available energy. The BCAA's help to increase muscle mass. The BCAA's, especially leucine, are great producers of energy under many kinds of stress from trauma to surgery, fever, infection, muscle training and chronic fatigue. With prolonged exercise

about 5 to 10% of the energy ed comes from amino acids, especially BCAAs. BCAAs should be used in *all* stress situations. The amount will depend on your physical state and stress level. Normal dosage of BCAA is 1000 to 3000 mg per day, divided. BCAAs should be taken together in one capsule formula not singularly. The ingestion of only one of the BCAA, particularly leucine causes the plasma tissue levels of the valine and isoleucine to decrease. The BCAA formula is a concentrated source for repair and growth in the body.

Who Benefits From BCAA:

- Amino Acid Deficiencies
- Athletes
- Bodybuilders
- Chronic Stress Syndrome
- Endurance Athletes
- Pre and post operative patients
- Cirrhosis patients
- Chronic Fatigue

REFERENCES:

- Block, K.P., In Friedman M. *Absorption and Utilization of Amino Acids. Vol 1.*, Boca Raton, Fl: CRC Press, 1989, 1978.
- Buse, M.G., Reid S.S. *Journal of Clinical Investigation. Vol 56, 1975, pp. 1250-1261.*
- Chua B.H., et al *American Journal of Physiology. Vol. 239, 1978 p. E510-4.*
- Meguid M.M., Moore F.D. *Practice of Surgery. Baltimore, MD: Harper & Row, Co., 1978, Chapter 15.*
- Pfeiffer, Carl and Braverman, Eric . *Healing Nutrients Within. New Canaan, CT: Keats Publishing, 1985.*
- Tischler M. et al. *Journal Biological Chemistry. Vol. 257 (4), 1982, pp. 1613-1621.*

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