

GUIDE TO AMINO ACIDS

Amino acids are the building blocks of protein. There are 24 amino acids, which form countless number of different proteins. They all contain nitrogen, oxygen, carbon and hydrogen. Amino acids are one of the three major sources of energy in the human body, the other two being fatty acids, and monosaccharides such as glucose.

Amino acids are linked together in construction of the body's proteins. Most amino acids are incorporated into proteins which are either structural or regulatory in nature. Structural proteins such as collagen and elastin, make up the muscles, tendons, ligaments and bones. Regulatory proteins, called enzymes, control the function of all of the metabolic pathways within the cells of the body. Some enzymes are general in their activity and help break down food. Class-specific enzymes regulate larger-scale processes.

Amino acids are 1) essential, 2) conditionally essential, or 3) nonessential. The "L" isomer of the amino acids has greater biological value, and is distinguished from the "molecular mirror image" isomer which is called the "D" form. Thus, references to the individual amino acids often begin with the prefix "L."

Essential aminos must be derived from food. There are eight of them: L-isoleucine, L-leucine, L-lysine, L-methionine, L-phenylalanine, L-tryptophan, L-threonine, and L-valine. Two others, L-arginine and L-histidine, are essential for children. An example of a "conditionally essential" amino is L-glutamine, which is not manufactured in sufficient quantity by the body during intense weight training, and therefore must be consumed to make up the deficit.

Nonessential aminos are manufactured internally in the quantities the body requires during times where stress or other factors do not provoke a greater-than-normal need for them. Their names are: L-alanine, L-asparagine, L-aspartic acid, L-citrulline, L-cysteine, L-cystine, L-glutamine, L-glutamic acid, glycine, L-ornithine, L-proline, L-serine, taurine, and L-tyrosine. Some of their roles are:

- **L-arginine** — An essential amino for prepubescent children, arginine is converted to ornithine in the adult body. It's usually used in supplement form by adults in combination with ornithine (another amino) for growth hormone stimulation, a practice of unproven efficacy.
- **L-alanine** — An energy producer and regulator of blood sugar.
- **L-asparagine** — An important factor in the metabolic processes of the nervous system.
- **L-aspartic acid** — Involved in the conversion of carbohydrates to muscle energy. A building block of immune system immunoglobulins and antibodies.
- **L-citrulline** — Helps detoxify ammonia, a byproduct of protein metabolism.
- **L-cysteine** — Performs detoxification duties in combination with L-aspartic acid and L-citrulline. Helps prevent damage from alcohol and cigarette smoke. Stimulates hair growth.
- **L-cystine** — A major partner in tissue anti-oxidant mechanisms. Contributes to improved healing, diminished pain from inflammation, and strong connective tissue.
- **L-glutamine** — Lymphocytes and other white blood cells, front-line fighters in the immune system, are strongly dependent on glutamine. Glutamine also helps memory and concentration, and aids in neutralizing the catabolic effects of cortisol which is released upon strenuous exercise.
- **L-glutamic acid** — An important metabolic factor in energy production, brain function and the immune system. In combination with vitamin B-6, glutamic acid is converted to L-glutamine in the liver, scavenging ammonia in the process.
- **Glycine** — Vital for the manufacture of amino acids in the body and in the structure of red blood cells. Glucose and creatine phosphate (CP), two substances pivotal to energy production, require glycine in their synthesis process.
- **L-histidine** — Along with growth hormone and certain other amino acids, vital to tissue growth. Important in the production of red and white blood cells.
- **L-isoleucine** — One of the three branched chain aminos, so-named because of its branching molecular configuration. The other two are leucine and valine. Together, they are indispensable for muscle growth and recovery. See Branched Chain Amino Acids (BCAAs).
- **L-leucine** — See L-isoleucine.
- **L-lysine** — Low levels can slow down protein synthesis, affecting muscle and connective tissue. Has inhibitory affect against viruses and used in treatment of herpes simplex.
- **L-ornithine** — see L-arginine.
- **L-methionine** — Removes poisonous wastes from your liver and assists in the regeneration of liver and kidney tissue.
- **L-phenylalanine** — Enhances learning, memory and alertness. A major element in the production of collagen, the main fibrous protein tissue in the body. Very useful for pain reduction in its modified D,L-phenylalanine form.
- **L-proline** — A major ingredient in the formation of connective tissue.
- **L-serine** — Important for the production of cellular energy and the formation of acetylcholine, a paramount brain chemical that aids memory and nervous system function.
- **L-threonine** — One of the amino detoxifiers. Prevents fatty buildup in the liver. Important component of collagen.
- **L-tryptophan** — Stimulates secretion of serotonin, a brain chemical that has a calming effect on the body. Used in the treatment of insomnia, stress and migraines. This essential amino acid was placed in the "drug" category by the FDA in 1988, an action which rendered virtually all commercially available essential amino acid mixtures worthless. Without any one of the 8 essentials present, none of the others can function.
- **L-tyrosine** — Important to the function of adrenal, pituitary and thyroid glands. Elevates mood and is used in the treatment of anxiety, depression and insomnia.
- **L-valine** — See L-isoleucine.