

Amino Acid Basics

Protein always seems to receive its fair share of attention from the media and pop culture. Amino acid buzzwords often make the news, but taken out of context, this information often is misleading. This article provides a frame of reference as to what the news is actually saying about amino acids and protein.

Role of protein

Carbohydrate, fat, alcohol, and protein are all composed of three elements—carbon, hydrogen, and oxygen. However, protein also has an additional element of nitrogen, and that is what makes it so unique. The nitrogen is responsible for the role of protein—to build and repair body tissues, produce hormones and digestive enzymes, and provide immune functioning. Protein is not efficiently used for energy production, but in certain circumstances, nitrogen is removed from protein molecules and used for energy. Protein is made up of amino acids.

Twenty-two amino acids are known to have a role in building and repairing body tissues and forming enzymes. Amino acids are found in foods in different concentrations and combinations. It is possible for the human body to synthesize (break down and reconfigure) most amino acids; these are called nonessential amino acids. It is not possible to synthesize some amino acids; these are obtained from foods. Amino acids often are referred to as “building blocks,” because they build tissue.

Essential amino acids

The following are essential amino acids:

- Histidine
- Isoleucine
- Leucine
- Lysine
- Methionine
- Phenylalanine
- Threonine
- Tryptophan
- Valine

Nonessential amino acids

- Alanine
- Arginine
- Asparagine
- Aspartic acid
- Cysteine
- Cystine
- Glutamic acid
- Glutamine
- Glycine
- Hydroxyproline
- Proline
- Serine
- Tyrosine

Not enough protein

In the average American diet, it is extremely rare to have a protein deficiency. Vegetarian and vegan diets require some extra attention to protein, but nuts, beans, many starches, soy, dairy, and eggs can more than adequately provide for protein needs.

Kwashiorkor refers to a condition resulting from not enough protein, but in the presence of adequate caloric intake. If the diet does not have enough protein and calories, the condition is termed marasmus or protein-energy malnutrition. This condition is common in third-world countries, hospital settings, and with conditions of extreme physiological stress.

Too much protein

Excess protein in the diet sometimes is taxing to the kidneys and limits calcium absorption. Because protein often is present in high-fat foods, excess protein may lead to excess fat intake, which may promote obesity, cardiovascular disease, and cancer.

Protein recommendations

For the average adult, 0.8 grams (g) of protein/kilogram (kg) body weight is recommended. Average requirements are between 45-60 g/day. Protein needs are higher and are individualized for:

- Infants
- Children
- Pregnant women
- Individuals with medical conditions such as hemorrhage, burns, protein malnutrition, surgery, and wounds
- Convalescent patients

Bodybuilding

Taking large doses of amino acids (arginine and ornithine are common) will not make muscles bigger or stronger. To date, no scientific evidence exists to prove that individual amino acids have a bodybuilding effect.

The same is true for protein supplementation. Additional calories in the form of food and exercise are the one true way to gain muscle.

References

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