Sports Milestones for Protein

The knowledge that specific amino acids are beneficial in relation to exercise and muscle maintenance and gains is increasing, as on-trend vegetable protein ingredients emerge as new sports solutions.

by Saskia Oort

Protein claims related to "muscle maintenance and recovery," "development of muscle mass of strength athletes," "reconstruction and repair of muscle proteins after exercise in endurance athletes" and "supporting skeletal muscle protein accretion," have recently been assessed and found to be significantly substantiated by the European Food Safety Authority (EFSA). These claims provide protein suppliers with a strong base for further refinements in the sports nutrition space. In sports nutrition, whey protein has been the gold standard for decades, due to its high nutritional quality. However, whey protein as an ingredient is not as well defined as people may assume. All proteins are derived from genetic codes, depending on variety and species. Whey as a natural substance consists of ten major and numerous minor proteins. If derived from cheese production, the composition depends on the type of cheese produced, how the protein isolate is processed or even on whether it has been partially fractionated. Thus nutritional documentation may be more related to the individual ingredient than perceived, and we may in the future see protein suppliers looking to differentiate their proteins by adding brand and proprietary documentation.

Establishing Protein Needs

The nutritional qualities of proteins are measures that currently relate to studies on the needs of proteins in terms of adequate growth i.e. the balance between protein breakdown and synthesis. Unfortunately the growth of rodents has been the preferred model, the biology of which differs greatly from humans. The best studied human needs of nutritional protein have been conducted in infants, where the studies related to general growth. The needs of an adult man in terms of muscle building are more specific, however, as this relates to a specific tissue, myofibrillar protein; the main mass of lean muscle. Many studies have been conducted by methodologies, which unfortunately do not consider specific muscle mass, but overall protein uptake. This does not include potential opportunities in modern biotechnologies such as isotope tracing, mass spectrometry patterns of digestive products and feeding time. The typical measure has been nitrogen in/out calculations, which do not consider the conversion of the nitrogen. The large nutritional question today is how to solve the issue of defining adequate protein at the right day and time.

Biological Pathways

We do know that each individual amino acid has its own set or sets of biological pathways, and therefore individual physiological importance and nutritional role. Our physiologies are related to hereditary physiognomy, whether the individual is a pyknic or leptosomic type, what the external physical conditions of climate in relation to metabolism are, and, secondarily, what our habits of self-imposed activities are, such as mental work or exercise. This reflects our metabolic turnover as an individual and thereby also our physiological demands on protein basal needs, as well as the extra needs under circumstances such as such as physical activity.

What we really need to know more about is the change of amino acid homeostasis in relation to exercise; whether moderate or extreme. Interestingly, recent studies at the University of Birmingham revealed that the protein balance, being individual, also fluctuated during the day in relation to our feeding state, but also that the so-called mixed muscle protein balance is more dependent on time of protein intake in relation to exercise than to dosage. The researchers concluded that the total amount of protein intake does not determine muscle gain and that there was no evidence that >2g protein/kg body weight had any impact on muscle mass building. The group concluded

Exercise & Amino Acids

L-Leucine: Stimulates protein synthesis in muscle and is closely associated with the release of glucose-generating precursors, such as alanine, from muscle.

L-Lysine: Plays a major role in calcium absorption; building muscle protein; recovering from surgery or sports injuries; and the body's production of hormones, enzymes, and antibodies.

L-Valine: Along with the other branched-chain amino acids, makes up about 1/3 of the body's skeletal muscle.

L-Arginine: Amino acid with several important exercise-related functions. In addition to its anabolic effect in creatine synthesis, it is involved in the excretion of urea and the production of NO, which is important to blood vessel function and blood circulation.

L-Cysteine: Dietary supplementation of cysteine is recommended as it plays a key role in the synthesis of GSH – a molecule that plays a principal role in the body's main first line of defence.

L-Glycine: Glycine supplementation may be useful for treating conditions characterized by low energy and fatigue, such as hypoglycemia, anaemia and chronic fatigue syndrome (CFS).