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Amino-Acid-Metabolism

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Editorial

AA metabolism requires transamination as the first step, generating glutamate and alanine as the major products, followed by oxidative deamination of glutamate with glutamate dehydrogenase (GDH) to form nicotinamide adenine dinucleotide phosphate-oxidase (NAD(P)H), which is converted to ATP. The inborn errors of amino acid metabolism are a family of genetic conditions in which an enzyme deficiency results in the accumulation of a ninhydrin-positive amino acid or a proximal metabolite. They are conceptually identical to disorders caused by enzyme defects that result in the accumulation of the organic acid intermediates. The current chapter strives to highlight the clinical, biochemical, molecular, and pathological features of defects in aromatic amino acid processing and related neurotransmitter metabolism disorders, disorders of glycine metabolism, defects in the processing of sulfur-containing amino acids, disorders of branched-chain amino acid metabolism, proline metabolism, urea cycle disorders, and defects of serine synthesis. Amino acid nitrogen forms ammonia, which is toxic. The liver is the major site of amino acid metabolism in the body and the major site of urea synthesis. The liver is also the major site of amino acid degradation, and partially oxidizes most amino acids, converting the carbon skeleton to glucose, ketone bodies, or CO2. Amino acids are the building blocks of our cellular machinery in the form of proteins and protein complexes. In addition, many important metabolites (i.e., purine/pyrimidines, neurotransmitters etc.) are products of cellular amino acid metabolism.

When excessive amounts of amino acids are taken, catabolism by enzymes in the liver and elsewhere is accelerated when intake exceeds requirements. In addition, changes in the free amino acid levels in the brain signal the nervous system centers regulating food consumption, and eating patterns are affected. Oxidation is a major protein degradation pathway which can result in the covalent modification of amino acid residues in the protein chain. Oxidizing agents such as peroxides, dissolved oxygen, metal ions, light and free radicals can catalyze the reaction. Removal of amino group is a crucial step in the amino acid catabolism. The nitrogen of the amino groups (amino nitrogen) can not be used for energy production and must be removed from our body. The first way is an amino nitrogen conversion to a urea (about 95 %), followed by urea excretion from the body via the urine. Proper amino acid levels are important for muscle development and strength. They help control the balance between the atrophy and growth of human muscle. Supplementing your diet with essential amino acids may increase the supply of nitrogen to your body.

Amino acid activation (also known as aminoacylation or tRNA charging) refers to the attachment of an amino acid to its Transfer RNA (tRNA). Aminoacyl transferase binds Adenosine triphosphate (ATP) to amino acid, PP is released. Aminoacyl TRNA synthetase binds AMP-amino acid to tRNA. The AMP is used in this step. In animals, amino acids can undergo oxidative degradation in three different metabolic circumstances. ... The carbon skeletons of the amino acids generally find their way to the citric acid cycle, and from there they are either oxidized to produce chemical energy or funneled into gluconeogenesis. Amino acids are transported to the liver during digestion and most of the body's protein is synthesised here. If protein is in excess, amino acids can be converted into fat and stored in fat depots, or if required, made into glucose for energy by gluconeogenesis which has already been mentioned. AA metabolism requires transamination as the first step, generating glutamate and alanine as the major products, followed by oxidative deamination of glutamate with glutamate dehydrogenase (GDH) to form nicotinamide adenine dinucleotide phosphate-oxidase (NAD(P)H), which is converted to ATP. The aromatic amino acids are the ones that have an aromatic group and benzene ring on their side chain. An example is phenylalanine and tyrosine and tryptophan. Alanine and other amino acids travel to the liver, where the carbons are converted to glucose and ketone bodies and the nitrogen is converted to urea, which is excreted by the kidneys.

Transamination is the major process for removing nitrogen from amino acids. Amino acids can also be used as a source of energy by the body. Amino acids are classified into three groups: Essential amino acids. Taken together, our results show that different amino acid diets given for 9 weeks exert no impact on healthy kidneys, but they suggest that in CKD, high levels of dietary BCAAs exert a deleterious effect on progression, whereas high levels of AAAs surprisingly display a protective effect. Muscle tissue uses more energy than fat tissue, so as you build up muscle, your metabolism revs up and you burn more calories. So, if amino acid supplementation can help you build more muscle, it can potentially boost weight loss. The key here may be to supplement with BCAAs, or branched-chain amino acids. Amino acids have been used to produce antimicrobial peptides that are more efficient as antimicrobial and antibiofilm agents and less prone to resistance. There are nine

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essential amino acids, which you must get through your diet: histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine. They're vital for functions such as protein synthesis, tissue repair and nutrient absorption. There is no nutritional rationale to the use of amino acids as dietary supplements, and such a practice can be dangerous. Supplemental amino acids are used for pharmacological rather than nutritional purposes.

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