

II. Glutamine and glutamate.

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Source

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Abstract

Glutamine and glutamate with proline, histidine, arginine and ornithine, comprise 25% of the dietary amino acid intake and constitute the "glutamate family" of amino acids, which are disposed of through conversion to glutamate. Although glutamine has been classified as a nonessential amino acid, in major trauma, major surgery, sepsis, bone marrow transplantation, intense chemotherapy and radiotherapy, when its consumption exceeds its synthesis, it becomes a conditionally essential amino acid. In mammals the physiological levels of glutamine is 650 micromol/l and it is one of the most important substrate for ammoniogenesis in the gut and in the kidney due to its important role in the regulation of acid-base homeostasis. In cells, glutamine is a key link between carbon metabolism of carbohydrates and proteins and plays an important role in the growth of fibroblasts, lymphocytes and enterocytes. It improves nitrogen balance and preserves the concentration of glutamine in skeletal muscle. Deamidation of glutamine via glutaminase produces glutamate a precursor of gamma-amino butyric acid, a neurotransmission inhibitor. L-Glutamic acid is a ubiquitous amino acid present in many foods either in free form or in peptides and proteins. Animal protein may contain from 11 to 22% and plants protein as much as 40% glutamate by weight. The sodium salt of glutamic acid is added to several foods to enhance flavor. L-Glutamate is the most abundant free amino acid in brain and it is the major excitatory neurotransmitter of the vertebrate central nervous system. Most free L-glutamic acid in brain is derived from local synthesis from L-glutamine and Krebs's cycle intermediates. It clearly plays an important role in neuronal differentiation, migration and survival in the developing brain via facilitated Ca⁺⁺ transport. Glutamate also plays a critical role in synaptic maintenance and plasticity. It contributes to learning and memory through use-dependent changes in synaptic efficacy and plays a role in the formation and function of the cytoskeleton. Glutamine via glutamate is converted to alpha-ketoglutarate, an integral component of the citric acid cycle. It is a component of the antioxidant glutathione and of the polyglutamated folic acid. The cyclization of glutamate produces proline, an amino acid important for synthesis of collagen

and connective tissue. Our aim here is to review on some amino acids with high functional priority such as glutamine and to define their effective activity in human health and pathologies.