

Amino acids and immune function

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Abstract

A deficiency of dietary protein or amino acids has long been known to impair immune function and increase the susceptibility of animals and humans to infectious disease. However, only in the past 15 years have the underlying cellular and molecular mechanisms begun to unfold. Protein malnutrition reduces concentrations of most amino acids in plasma. Findings from recent studies indicate an important role for amino acids in immune responses by regulating: (1) the activation of T lymphocytes, B lymphocytes, natural killer cells and macrophages; (2) cellular redox state, gene expression and lymphocyte proliferation; and (3) the production of antibodies, cytokines and other cytotoxic substances. Increasing evidence shows that dietary supplementation of specific amino acids to animals and humans with malnutrition and infectious disease enhances the immune status, thereby reducing morbidity and mortality. Arginine, glutamine and cysteine precursors are the best prototypes. Because of a negative impact of imbalance and antagonism among amino acids on nutrient intake and utilisation, care should be exercised in developing effective strategies of enteral or parenteral provision for maximum health benefits. Such measures should be based on knowledge about the biochemistry and physiology of amino acids, their roles in immune responses, nutritional and pathological states of individuals and expected treatment outcomes. New knowledge about the metabolism of amino acids in leucocytes is critical for the development of effective means to prevent and treat immunodeficient diseases. These nutrients hold great promise in improving health and preventing infectious diseases in animals and humans.