

Kwas alfa-liponowy w prewencji powikłań cukrzycowych

Alpha-lipoic Acid in the Prevention of Diabetes Complications

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Summary:

Diabetes is a group of metabolic disorders characterized by a high blood sugar level (hyperglycemia) over a prolonged period of time. Diabetes is due to either the pancreas not producing enough insulin, or the cells of the body not responding properly to the insulin produced (insulin resistance). Chronic hyperglycemia is associated with damage of small and large blood vessels in many tissues and organs (micro- and macroangiopathy). Microvascular complications may contribute to the diabetic retinopathy and neuropathy. Diabetes is strongly associated with increased oxidative stress, which could be a consequence of either increased production of free radicals or reduced antioxidant defenses. Many of the biochemical pathways (e.g., protein glycation, polyol pathway, protein kinase C activation) associated with hyperglycemia can result in increased reactive oxygen species. An ideal therapeutic antioxidant should fulfill several criteria. These include absorption from the diet, conversion in cells and tissues into usable form, a variety of antioxidant actions (including interactions with other antioxidants) in both membrane and aqueous phases, and low toxicity. Alpha-lipoic acid is unique among natural antioxidants in its ability to fulfill all of these requirements. Alpha-lipoic acid has been shown to have diverse beneficial effects suggesting that it acts by multiple mechanisms on oxidative stress parameters. Alpha-lipoic acid's antioxidant properties consist of the following: 1) its capacity to directly scavenge reactive oxygen species, 2) its ability to regenerate endogenous antioxidants, such as glutathione, vitamins E and C, and 3) its metal chelating activity, resulting in reduced reactive oxygen species production. Alpha-lipoic acid prevents micro-vascular damage through normalized pathways downstream of mitochondrial overproduction of reactive oxygen species. Alpha-lipoic acid inhibits diabetes-induced apoptosis of both endothelial cells and pericytes, signs and predictor of retinopathy, and prevents nerve ischemia and hypoxia which could cause neuropathy. Alpha-lipoic acid supplementation is an achievable adjunct therapy to help prevent vision loss and reduce neuropathic symptoms in diabetic patients. Honokiol is a natural polyphenolic compound extracted from the bark, cone and leaves of Magnolia. Honokiol is used in traditional Chinese and Japanese medicine for the treatment of various diseases. This promising bioactive compound presented a wide range of therapeutic and biological activities which include neuroprotective, anti-spasmodic, antidepressant, anti-tumorigenic, antithrombotic, antimicrobial, analgesic properties, and others. Some of its mechanism for exhibiting its pharmacological effects includes inhibition of oxidative stress and suppression of pro-inflammatory cytokines (TNF- α , IL-10 and IL-6). Honokiol might exert its protective effect on hyperglycemia-induced cell damage in human endothelial cells through the inhibition of NF- κ B and COX-2 upregulation. Low-dose of honokiol may have the potential to protect endothelial cells from damage associated with elevated glucose.

Key words:

alpha-lipoic acid, dihydrolipoic acid, diabetic retinopathy, diabetic neuropathy, oxidative stress, diabetes, honokiol.

Słowa kluczowe:

kwas alfa-liponowy, kwas dihydroliponowy, retinopatia cukrzycowa, neuropatia cukrzycowa, stres oksydacyjny, cukrzyca, honokiol.