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Short Commentary

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Carnitine: its role in preventive medicine

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Type 2 diabetes (T2D) is a complex heterogeneous group of metabolic conditions. The hallmark of the disorder is the increased levels of blood glucose due to impaired insulin action and/or insulin secretion. The increasing prevalence of the disorder is spreading intensively throughout the world as a consequence of an aging population and changes in lifestyle. Today, more than 150 million people have been affected worldwide, and this number is estimated to increase to 366 million by the year 20301. There are many complications associated with diabetes, such as atherosclerosis, coronary artery disease, ischemic heart disease, stroke, neuropathy, retinopathy, and nephropathy.

An affected carbohydrate and lipid metabolism is clearly established in this disorder. Scientific data support the theory in which the dysregulated fatty acid metabolism along with tissue lipid accumulation are associated with the development of insulin resistance and T2D2,3,4. Since carnitine has a crucial role in fatty acid metabolism, it is likely to be a potential adjuvant in the treatment of T2D. This brief review will focus upon the recent knowledge of carnitine and its derivatives in the development and management of T2D.

Carnitine is a vitamin-like water soluble small molecule featuring a number of essential roles in intermediary metabolism. The primary physiological role is associated with the cellular energy producing processes through the transport of long-chain fatty acids from the cytosol into the mitochondria, where their degradation takes place via β-oxidation.

No infection has been reported from the

This role is fundamental, since neither the free long chain fatty acids, nor their Coenzyme-A esters can cross the inner mitochondrial membrane on their own; the transport is possible exclusively in carnitine ester form 5. The acyl moieties are transferred between the Coenzyme-A and the carnitine by the carnitine palmitoyltransferase I and II reversible reactions. The direct transfer of the carnitine esters across the membrane is catalyzed by the carnitine translocase6. Beyond its classical physiological role, carnitine has additional crucial functions in the body. Notably, carnitine modifies the acyl-CoA/CoA ratio, which in turn regulates the activity of several mitochondrial enzymes involved in tricarboxylic acid cycle (TCA), fatty acid oxidation, urea cycle and gluconeogenesis7. It is involved in energy storage in the form of acetyl carnitine, and modulates the toxicity of partially metabolized acyl groups by facilitating their excretion in carnitine ester form8. Furthermore, L-carnitine has been demonstrated to bear anti-inflammatory and antioxidant properties9,10,11 and improves insulin sensitivity, protein nutrition, dyslipidemia, and membrane stability12. Due to its pivotal role in intermediary metabolism it is not surprising that plasma and tissue levels of L-carnitine are maintained within a relatively narrow homeostatic range which is controlled by carrier mediated gastrointestinal absorption from dietary sources, endogenous biosynthesis, extensive renal tubular reabsorption, and compartmentalization through carrier-mediated transport between plasma and tissue. implantation in laparoscopic oncological surgery.

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