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Effects of carnitine on thyroid hormone action

Salvatore Benvenga [1], Antonino Amato, Menotti Calvani, Francesco Trimarchi

Affiliations
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Abstract

By experiments on cells (neurons, hepatocytes, and fibroblasts) that are targets for thyroid hormones and a randomized clinical trial on iatrogenic hyperthyroidism, we validated the concept that L-carnitine is a peripheral antagonist of thyroid hormone action. In particular, L-carnitine inhibits both triiodothyronine (T3) and thyroxine (T4) entry into the cell nuclei. This is relevant because thyroid hormone action is mainly mediated by specific nuclear receptors. In the randomized trial, we showed that 2 and 4 grams per day of oral L-carnitine are capable of reversing hyperthyroid symptoms (and biochemical changes in the hyperthyroid direction) as well as preventing (or minimizing) the appearance of hyperthyroid symptoms (or biochemical changes in the hyperthyroid direction). It is noteworthy that some biochemical parameters (thyrotropin and urine hydroxyproline) were refractory to the L-carnitine inhibition of thyroid hormone action, while osteocalcin changed in the hyperthyroid direction, but with a beneficial end result on bone. A very recent clinical observation proved the usefulness of L-carnitine in the most serious form of hyperthyroidism: thyroid storm. Since hyperthyroidism impoverishes the tissue deposits of carnitine, there is a rationale for using L-carnitine at least in certain clinical settings.

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