

Letter to the Editor

L-carnitine supplementation in hypothyroidism

Dear Editor,

Benvenga *et al.* have comprehensively investigated the effects of L-carnitine on thyroid hormone metabolism [1-3]. We would like to offer additional remarks aimed at providing further scientific and clinical insights into the relationship between L-carnitine and thyroid function [4]. Our annotations concern the safety and tolerability of L-carnitine, its formulation, the possible addition of liothyronine (LT3) to treat related symptoms, and the identification of patients most likely to benefit from L-carnitine supplementation.

Our study [4] confirms previous observations by Benvenga *et al.* [2, 3], that L-carnitine supplementation for 12 weeks is well tolerated and causes few drug-related adverse events in hypothyroid patients. The overall incidence of adverse events was 33%, both in the placebo group and in the L-carnitine group [4]. Liver and kidney function as well as lipid profiles were unchanged during the study period [4]. Two patients in the L-carnitine group discontinued therapy due to adverse events (one due to nausea and the other to epigastric discomfort) as did three in the placebo group (due to abdominal pain, dry mouth, and sinus bradycardia, respectively) [4]. None of the patients in the L-carnitine group reported angina pectoris, hypoesthesia, gastroesophageal reflux, dry mouth, chest

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discomfort, dental caries, sinus bradycardia, laryngitis, pruritus, urticaria, cystitis, or diarrhea [4].

In our study, L-carnitine was administered daily in two divided oral doses (three tablets twice daily, 330 mg/tablet), totaling 1,980 mg over 12 weeks [4]. The regimen of Benvenga *et al.*, which consisted of a one 1-g ampoule administered twice daily, may be more practical [2]. The beneficial effects in the subgroup of our patients with higher carnitine levels suggests that in patients with total carnitine levels of $< 60.9 \mu\text{mol/L}$ the supplemented dose of L-carnitine used in our study was insufficient to relieve fatigue [5]. Further investigations are needed to evaluate the effects of a higher supplementation dose of L-carnitine.

For patients with hypothyroidism who feel unwell on levothyroxine (LT4) therapy alone, evidence supporting the routine use of LT4 and LT3 combination therapy is lacking [5]. In our study, the beneficial effects of L-carnitine supplementation in the subgroup with higher free T3 levels suggested that these patients will not have additional symptom relief from LT3 combination therapy.

To identify patients in whom L-carnitine supplementation will result in greater fatigue relief, we conducted subgroup analyses according to patient age, etiology of the hypothyroidism, thyroid hormone levels, and carnitine levels. Both physical (PFS) and mental (MFS) fatigue scores improved significantly in patients < 50 years of age and in those with free T3 levels $\geq 4.0 \text{ pg/mL}$ who were treated with L-carnitine rather than placebo. Furthermore, L-carnitine treatment significantly improved the MFS of patients with hypothyroidism after thyroid cancer surgery. This is the first report to show that L-carnitine may be useful in alleviating fatigue symptoms in patients with hypothyroidism, especially those younger than 50 years of age and those whose hypothyroidism developed after thyroidectomy for thyroid cancer. We therefore propose tailored/targeted L-carnitine supplementation in these groups of hypothyroid patients.

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