

Article Title: Association between fatigue, peripheral serotonin, and L-carnitine in hypothyroidism and in chronic fatigue syndrome

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Overview: This study investigates the relationship between fatigue, peripheral serotonin levels, and L-carnitine supplementation in patients diagnosed with Chronic Fatigue Syndrome (CFS) and those with hypothyroidism who experience persistent fatigue despite treatment.

Background: Fatigue is a hallmark symptom of CFS and remains a problem for approximately 15–20% of hypothyroidism patients even after their thyroid levels are stabilized with medication. Emerging research has suggested a link between low peripheral serotonin and fatigue in other conditions, such as long COVID and fibromyalgia. While peripheral serotonin was once thought primarily to regulate intestinal mobility, it is now understood to play a role in systemic energy homeostasis. Because L-carnitine is known to support mitochondrial energy production and has been shown to increase serotonin in animal brains, researchers hypothesized that L-carnitine supplementation could increase low peripheral serotonin and reduce fatigue in humans.

Method: A retrospective chart review was performed on 52 patients, including 40 patients with hypothyroidism and persistent fatigue and 12 patients with chronic fatigue syndrome. Participants received oral L-carnitine 300 mg twice daily for 7 weeks. Serum serotonin (S-5-HT) levels and fatigue scores were measured before and after treatment, where 0 represented no fatigue and 10 represented maximal fatigue. Each patient served as their own control, with comparisons made between pre- and post-supplementation values.

Findings:

- Before supplementation, serum serotonin levels were below the normal range in both the CFS and hypothyroidism groups
- After 7 weeks of L-carnitine, serotonin levels increased 8-fold in the CFS group and 6-fold in the hypothyroidism group, reaching normal levels
- Fatigue scores decreased approximately 2-fold in both groups following the supplementation period
- Statistically significant negative correlation between S-5-HT levels and fatigue scores, meaning that as serotonin levels increased, reported fatigue decreased

Limitations:

- CFS group was relatively small (N=12), which can make reliable correlation estimates difficult
- Study focused specifically on the serotonin pathway, so it's unknown if other metabolic pathways were also affected by the L-carnitine
- Fatigue was measured using a single-item numerical scale rather than a more multi-dimensional fatigue questionnaire
- No control group
- Short follow-up period of only 7 weeks
- Study population consisted primarily of Caucasian patients, limiting generalizability