

Interaction between levothyroxine and calcium carbonate

Elias E. Mazokopakis MD PhD Triantafillos G. Giannakopoulos MD Ioannis K. Starakis MD PhD

Levothyroxine (L-T₄) is one of the most commonly prescribed medications. It is given as either physiologic replacement therapy in patients with hypothyroidism or as interventional therapy to suppress thyroid-stimulating hormone (TSH) secretion in patients with nodular thyroid disease or thyroid cancer.

Patients treated with L-T₄ suppressive therapy (a state known as exogenous subclinical hyperthyroidism) might be at increased risk for osteoporosis. Because of this, patients are encouraged to take a calcium supplement, such as calcium carbonate.¹ Calcium supplementation is especially important for preventing or treating osteoporosis in postmenopausal women. However, several conditions or drugs might alter L-T₄ requirements for both replacement and interventional therapy.² We report a case of clinically significant interaction between L-T₄ and calcium carbonate.

Case description

A 64-year-old woman with hypothyroidism visited our hospital because of clinically significant changes shown in results of thyroid function tests. For many years her hypothyroidism was well controlled with 88 µg/d of L-T₄ (TSH ≤ 2 mIU/L; normal range 0.3 to 4 mIU/L). She had been diagnosed with osteopenia 1 year earlier and was treated with oral calcium carbonate (2500 mg/d=1 g elemental calcium/d). Three months after the patient started taking calcium carbonate, a clinical examination and results of laboratory tests revealed hypothyroidism; thyroid function test results showed an increase in TSH serum level (9.8 mIU/L) and a decrease in serum free thyroxine (FT₄) level (0.2 ng/dL; normal range 0.8 to 2 ng/dL). The L-T₄ dose was increased to 112 µg/d, which improved the patient's symptoms during the following months (TSH level 6.4 mIU/L).


Because the hypothyroidism persisted, the L-T₄ dose was increased to 125 µg/d, and her symptoms slowly resolved (TSH level 2.7 mIU/L). The patient stopped taking calcium carbonate during the following months, without medical advice, and her TSH level decreased to 0.1 mIU/L (exogenous subclinical hyperthyroidism). Because of the obvious interaction between L-T₄ and calcium carbonate in our patient, we decreased the dose of L-T₄ to 88 µg/d. A more detailed history revealed that our patient was taking the calcium carbonate at the same time as L-T₄. After more than a year following the patient's initial presentation, her TSH level reverted to and remained

at normal limits. The patient refused to take calcium carbonate again despite our recommendation.

Discussion

This case report confirms the importance of timing for patients taking calcium carbonate and L-T₄. Recent studies³⁻⁵ have shown that taking calcium carbonate within 4 hours of L-T₄ might decrease absorption of L-T₄ by nearly a third. Also, patients knowing about this interaction seems to be insufficient.⁶ Patients who have taken L-T₄ with calcium carbonate consistently for years might have had their doses adjusted so they remained at therapeutic levels. However, patients who receive calcium carbonate sporadically or inconsistently might unknowingly change the absorption of L-T₄, causing variations in their medication levels.

Conclusion

It is important for patients and health care providers to know that calcium carbonate can interact with L-T₄ and affect its absorption. Education and warning labels on bottles of L-T₄ might help to decrease the risk of this clinically significant interaction. 

Dr Mazokopakis is Head and Dr Giannakopoulos is a clinical resident in the Department of Internal Medicine at Naval Hospital of Crete in Chania, Greece. Dr Starakis is an Assistant Professor of Medicine in the Department of Internal Medicine at Patras University Hospital in Rion, Greece.

Competing interests

None declared

Correspondence to: Dr Elias Mazokopakis, Iroon Polytechniu 38A, Chania 73 132, Crete, Greece; telephone 30 282 1082754; fax 30 282 1089307; e-mail emazokopakis@yahoo.gr

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