

P2-240: Absorption of thyroid drug levothyroxine improves with vitamin C

Vitamin C improves oral absorption of the thyroid hormone replacement drug levothyroxine, according to a new study. The results will be presented Monday, June 16, at The Endocrine Society's 90TH Annual Meeting in San Francisco.

Some patients taking this oral drug to treat an underactive thyroid have difficulty with its absorption into the bloodstream, said the coauthor who presented the findings, Sandra Licht, MD, an endocrinologist at the University of Buenos Aires in Argentina. Paula Antunez, also of the University of Buenos Aires, is the study's principal author.

With inadequate drug absorption, the patient's abnormally high blood levels of thyroid-stimulating hormone (TSH) fail to decrease, and symptoms continue, such as fatigue, depression, and weight gain. When this occurs, the patient usually needs a higher dose and further testing, she said.

Certain medications and digestive diseases interfere with the absorption of levothyroxine, but often malabsorption occurs for unknown reasons, Licht said.

Past research has shown that taking an acidic substance (hydrochloric acid) at the same time as the levothyroxine tablet may enhance the drug's absorption. Therefore, the authors studied whether simultaneous use of vitamin C (ascorbic acid) would improve dissolution of the levothyroxine tablet and thus absorption.

They studied 11 patients (eight women and three men) who were taking higher-than-average doses of levothyroxine but not reaching their target TSH levels, as found by two different blood tests. None of the patients had factors that interfered with levothyroxine absorption, such as celiac disease or use of calcium or iron supplements or antacids. For six weeks, patients took one gram of vitamin C with their levothyroxine pill. They diluted a vitamin C tablet in about seven ounces of water.

After six weeks, all 11 patients had decreased TSH levels, with an average reduction of about 69 percent. None of the patients achieved the desired level of TSH.

The decrease in TSH indirectly that levothyroxine absorption increased, Licht explained. She said that studies in larger numbers of patients are needed to confirm their finding.

Although the patients in their study diluted the vitamin C pill in water, Licht said she expects that swallowing the pill directly would have the same effects on drug absorption.

"Patients with difficulties in the absorption of levothyroxine should consider talking to their doctors about co-administration of vitamin C with levothyroxine," Licht said, "especially if they have a history of kidney stones, anemia, or acid reflux."

Sandra D Licht, *Private Practice*

Preliminary observations indicated that co-administration of acidic compounds might enhance absorption of levothyroxine. In order to assess whether this effect would be associated with vitamin C administration, we studied 11 patients (8 women and 3 men, age range 28-75 years; mean 45.2 ± 15.4) being treated with levothyroxine at doses of > 1.7 g/kg (average 2.24 ± 0.39 g/kg) but failing to achieve their target TSH level. During the control period, each patient had at least two determinations of TSH indicating inadequate dosage. Interfering factors that could alter levothyroxine absorption such as celiac disease, calcium, iron, or antacid use, and non-compliance were excluded.

During the study period, the patients continued the same dose of levothyroxine but supplemented it with 1g of vitamin C in 200 cc of water. After six weeks of taking the levothyroxine with vitamin C, serum TSH decreased in all 11 patients (average reduction $68.6 \pm 26.8\%$), and the target or desired level of TSH was achieved in 9/11 patients.

The difference between TSH levels before and after treatment with vitamin C was significant: Basal TSH (IFMA) was 8.54 ± 4.33 mIU/L vs. a mean TSH on vitamin C treatment of 1.88 ± 1.50 mIU/L ($p < 0.001$)

Conclusions: 1) Vitamin C enhances oral absorption of levothyroxine; 2) Co-administration of Vitamin C with levothyroxine should be considered in patients with difficulties in the absorption of levothyroxine