



THYROID HORMONE

Thyroid Stimulating Hormone (TSH) Levels Are Altered By The Timing Of Levothyroxine Administration

WHAT IS THE STUDY ABOUT?

Hypothyroidism is treated by Levothyroxine (L-T₄), which is the main hormone secreted by the thyroid gland. The dose of L-T₄ needed to treat hypothyroidism is affected by a variety of factors, including absorption from the intestines. Several medications interfere with the absorption of L-T₄, including calcium and iron. Taking L-T₄ with food and certain beverages, such as coffee, can also affect its' absorption. This has led to the traditional recommendation to patients has been to take L-T₄ on an empty stomach first thing in the morning before breakfast and to wait at least an hour before eating. The aim of this study was to determine how timing of L-T₄ administration affects its' absorption as determined by changes in the blood levels of TSH.

THE FULL ARTICLE TITLE:

Bach-Huynh TG et al. Timing of levothyroxine administration affects serum thyrotropin concentration. *J Clin Endocrinol Metab* 2009; July 7, jc.2009-0860 [pii];10.1210/jc.2009-0860 [doi]

WHAT WAS THE AIM OF THE STUDY?

The aim of this study was to determine how timing of L-T₄ administration affects its' absorption as determined by changes in the blood levels of TSH.

WHO WAS STUDIED?

The study subjects included 65 patients 18 to 75 years of age who had hypothyroidism for at least 2 years. The patients with hypothyroidism were required to have a stable TSH for >6 months while taking one of the two most popular brands of L-T₄.

HOW WAS THE STUDY DONE?

Thyroid hormone levels were determined at the entry of the study then patients completed three 8-week regimens related to the timing of L-T₄ administration: 1) take L-T₄ after an overnight fast at least 1 hour before breakfast; 2) take L-T₄ with breakfast; 3) take L-T₄ at bedtime, as long as that time was at least 2 hours after their last meal of the day. Thyroid hormone levels were repeated upon completion of each of the three regimens. The patients were asked to keep a diary on the time that they took the medication.

WHAT WERE THE RESULTS OF THE STUDY?

At the time of the baseline TSH determination, 88% of patients were taking their L-T₄ in the fasting state, 9% were taking L-T₄ at bedtime, and 3% were taking it at least an hour before breakfast. The TSH levels in the group that took L-T₄ before breakfast were the most stable within individuals. 55% of those who took L-T₄ with breakfast had TSH variations >1 while 35% of those taking L-T₄ at bedtime had TSH variations >1. While the average TSH in all the groups was in the normal range, the TSH was the lowest when the group took L-T₄ before breakfast and the highest when the group took L-T₄ with breakfast. This suggests that the absorption of Levothyroxine was different during these two periods.

HOW DOES THIS COMPARE WITH OTHER STUDIES?

There have not been many large studies on this topic. One small study showed that taking L-T₄ at bedtime was associated with lower TSH levels than taking it in the morning. This is the opposite of what was found in this study.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

Taking L-T₄ with breakfast or at bedtime is associated with a greater variability of absorption as shown by greater variability of TSH values. The most stable absorption of L-T₄ is seen in patients taking L-T₄ in a fasting state before breakfast. Hypothyroid patients should be encouraged to take their L-T₄ first thing in the morning if possible.

— Heather Hofflich, MD

ATA THYROID BROCHURE LINKS

Hypothyroidism: http://thyroid.org/patients/patient_brochures/hypothyroidism.html

Thyroid Hormone Treatment: http://thyroid.org/patients/patient_brochures/hormonetreatment.html

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ABBREVIATIONS & DEFINITIONS

Hypothyroidism — a condition where the thyroid gland is underactive and doesn't produce enough thyroid hormone. Treatment requires taking thyroid hormone pills.

Levothyroxine (L-T₄) — the major hormone produced by the thyroid gland and available in pill form as Levoxyl™, Synthroid™, Levotheroid™ and generic preparations.

Thyroxine (T₄) — the major hormone secreted by the thyroid gland. Thyroxine is broken down to produce Triiodothyronine which causes most of the effects of the thyroid hormones.

TSH — Thyroid stimulating hormone – produced by the pituitary gland that regulates thyroid function; also the best screening test to determine if the thyroid is functioning normally.