



THYROID FUNCTION TESTS

Biotin supplement use is common and can lead to the false measurement of thyroid hormone in commonly used assays

BACKGROUND

As the pace of clinical care accelerates, there is an increased dependency on laboratory tests to help guide decisions in medicine. However, laboratory tests can be affected by substances that interfere with different assays, leading to false results which in turn can potentially result in the wrong treatments given to patients. One such substance that has become very common is the supplement biotin, a water-soluble B vitamin, which is taken for a variety of proposed health benefits. Most people get sufficient biotin from a well balanced diet, and a daily adequate intake for biotin is approximately 30 mcg/day. Multivitamins typically contain anywhere from 30-300 mcg biotin, while the supplements sold for hair and nail supplements usually range from 5,000 to 10,000 mcgs. High dose biotin is marketed as a means to improve hair and skin health.

There are numerous reports of biotin interference with laboratory testing, specifically with thyroid function tests. Most commonly, biotin use can result in falsely high levels of T₄ and T₃ and falsely low levels of TSH, leading to either a wrong diagnosis of hyperthyroidism or that the thyroid hormone dose is too high. The ATA has recommended that patients stop taking biotin for at least 2 days before thyroid testing to avoid the risk of having a misleading test.

At present, there are no studies that have looked into the extent of biotin use or the blood levels of biotin seen in the general patient population. This study reports the use of multivitamins and biotin supplements by outpatients in Rochester, Minnesota, and also reports plasma biotin levels in patients seen in the Mayo Clinic emergency department.

THE FULL ARTICLE TITLE

Katzman BM et al 2018 Prevalence of biotin supplement usage in outpatients and plasma biotin concentrations in patients presenting to the emergency department. Clin Biochem. Epub 2018 Jul 20. PMID: 30036510.

SUMMARY OF THE STUDY

The goal of this study was to determine how common

biotin consumption was in a population using a questionnaire and also measuring biotin levels in samples collected from patients presenting to the emergency department at Mayo Clinic. A total of 4000 questionnaires were distributed to patients scheduled for blood work during a period of one week (July 10-14, 2017), and 1944 patients returned completed questionnaires. There was a very similar number of male and female responders.

A total of 812 (41.8%) of patients reported taking multivitamins and 149 patients (7.7%) reported taking biotin supplements. Of these, 29.5% did not know what dose they were taking, 8.1% reported taking 10,000 mcgs, 14.8% reported 5,000mcgs, 18.1% reported 1,000 mcg and 47% reported taking less than 1000 mcgs.

Biotin was measured in residual plasma samples from specimens of patients presenting to the emergency department over a two week period representing 1442 unique blood samples. Biotin levels were unmeasurable in 737 samples, > 5ng/mL in 705 samples and >10 ng/mL in 107 (7.4%) of samples. Of these 107 patients, only 2 had biotin reported in their electronic medical records. A total of 14 patients had biotin concentrations >30 mg/mL.

The lowest concentration at which biotin has been reported to interfere in a commonly used assay is 10 ng/mL, however the concentration at which it may interfere with other assays may be different (higher or lower).

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

This study showed that >7% of patients seen in the emergency department at Mayo Clinic had biotin levels sufficient to cause false lab results with commonly used laboratory assays that measure thyroid hormone. Further, only ~30% of those reported taking biotin or multivitamins. This study is important for patients because it shows the magnitude at which a commonly used supplement can cause false laboratory test results that can lead to misdiagnosis and wrong treatments.

— Jessie Block-Galarza, MD





THYROID FUNCTION TESTS, continued

ATA THYROID BROCHURE LINK

Thyroid Function Tests: <https://www.thyroid.org/thyroid-function-tests/>

ABBREVIATIONS & DEFINITIONS

Biotin: a water-soluble B vitamin that is involved in a wide range of metabolic processes, both in humans and in other organisms, primarily related to the utilization of fats, carbohydrates, and amino acids. It is taken as a supplement frequently to promote skin, hair and nail health.

Thyroxine (T₄): the major hormone produced by the thyroid gland. T₄ gets converted to the active hormone T₃ in various tissues in the body.

Triiodothyronine (T₃): the active thyroid hormone, usually produced from thyroxine.

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.

DECEMBER Thyroid & Development Awareness Month



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