



THYROID FUNCTION TESTS

TSH alone would be a sufficient screening test for thyroid hormone abnormalities

BACKGROUND

Thyroid problems are common in adults. There are different recommendations on how to screen for abnormal thyroid hormone levels that may indicate a thyroid problem, and therefore, there are many variations in how this is done. Thyroid Stimulating Hormone (TSH) is the most commonly ordered test, with free thyroxine (FT₄) levels ordered at the same time as TSH in 38% of the cases. In a one-step approach, both TSH and FT₄ are measured initially. Alternatively, TSH is measured first, then FT₄ is measured only if TSH is abnormal in a two-step approach. The cost for testing thyroid function in the United States is high, estimated at \$1.6 billion every year. The present study was done to determine whether a one-step approach would be sufficient to screen for thyroid hormone abnormalities, and whether there is a clinical risk score that can be used to predictor risk of developing abnormal thyroid hormone levels.

THE FULL ARTICLE TITLE

Schneider C et al 2018 Initial evaluation of thyroid dysfunction—are simultaneous TSH and fT₄ tests necessary? PLoS One 13:e0196631.PMID: 29709030.

SUMMARY OF THE STUDY

The results of thyroid function tests from 4,471 adults in Bussleton, Australia from 1994 were studied using previously collected records. Those who were taking thyroid medications were excluded from the study. Participants with normal TSH were considered euthyroid (normal thyroid function), those with slightly high TSH and normal FT₄ were considered mildly hypothyroid (subclinical hypothyroidism), those with very high TSH or slightly high TSH with low FT₄ were considered severely hypothyroid (overt hypothyroidism). Participants with low TSH and normal FT₄ were considered mildly hyperthyroid (subclinical hyperthyroidism), and with low TSH and high FT₄ were considered severely hyperthyroid (overt hyperthyroidism).

The proportion of people with normal TSH and low or high FT₄ levels, who would have been missed with a one-step approach were calculated. Various characteristics of participants, including gender, age, smoking status, height, weight, body mass index (BMI), blood pressure, alcohol use, use of thyroid-affecting medications, and menopausal status, were used to determine whether these can be used to calculate a score to predict risk of thyroid hormone abnormalities.

The average age of participants was 51 years (range, 16.5-97) and 55% were women. This population was considered iodine-sufficient and mostly white. Of 4,471 adults, 35 (0.8%) had overt hypothyroidism, 86 (1.9%) subclinical hypothyroidism, 23 (0.5%) overt hyperthyroidism, and 170 (0.5%) subclinical hyperthyroidism. A total of 82 (1.8%) had normal TSH and low FT₄ levels, and 87 (1.9%) had normal TSH and high FT₄ levels. The FT₄ levels were very close to the normal range in a majority (144 participants, 85%) of 169 participants with normal TSH but low or high FT₄ levels.

Significant risk factors for hypothyroidism included being female, age 50 to 75 years, age > 75 years, and BMI ≥ 30kg/m². The only significant risk factor for hyperthyroidism was smoking status. However, both sets of risk factors did not have good level of prediction of thyroid hormone abnormalities.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

Only 7% of adults needed both TSH and FT₄ to be checked to determine whether their thyroid hormone levels were abnormal. Even in those with low or high FT₄ but normal TSH, FT₄ levels were very close to normal range, and unlikely to have caused any clinical symptoms that warranted treatment.

Since the majority of patients did not need FT₄ levels to make the diagnosis of thyroid hormone abnormali-





THYROID FUNCTION TESTS, continued

ties, it would be most cost-effective to have a two-step approach in assessing thyroid dysfunction, where TSH is measured and FT₄ is measured only if TSH is abnormal. There are rare cases of hypothyroidism from pituitary

problem, where both TSH and FT₄ levels are low, but these patients typically have other clinical signs that would suggest such diagnosis.

— Sun Y. Lee, MD

ATA THYROID BROCHURE LINKS

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

Hyperthyroidism (Overactive): <https://www.thyroid.org/hyperthyroidism/>

Hypothyroidism (Underactive): <https://www.thyroid.org/hypothyroidism/>

ABBREVIATIONS & DEFINITIONS

Euthyroid: a condition where the thyroid gland as working normally and producing normal levels of thyroid hormone.

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

Subclinical Hypothyroidism: a mild form of hypothyroidism where the only abnormal hormone level is an increased TSH. There is controversy as to whether this should be treated or not.

Overt Hypothyroidism: clear hypothyroidism with an increased TSH and a decreased T₄ level. All patients with overt hypothyroidism are usually treated with thyroid hormone pills.

Hyperthyroidism: a condition where the thyroid gland is overactive and produces too much thyroid hormone. Hyperthyroidism may be treated with antithyroid meds (Methimazole, Propylthiouracil), radioactive iodine or surgery.

Subclinical Hyperthyroidism: a mild form of hyperthyroidism where the only abnormal hormone level is a decreased TSH.

Overt Hyperthyroidism: clear hyperthyroidism with a decreased TSH and an increased T₄ levels.

Central hypothyroidism: a rare cause of hypothyroidism where the thyroid gland is normal and the problem is inadequate TSH secretion from the pituitary gland.

Pituitary gland: this endocrine gland sits at the base of the brain and secretes hormones that control thyroid and adrenal function, growth and reproduction. The pituitary gland secretes TSH to control thyroid function.

