



The British Medical Journal 293:808-810

## **Are biochemical tests of thyroid function of any value in monitoring patients receiving thyroxine replacement?**

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Most physicians, including endocrinologists, rely on standard thyroid tests to determine their patients' "proper" dose of thyroid replacement. The evaluation of a patient's signs and symptoms to determine the proper dose has been reduced to the point of being unimportant to most physicians. This study demonstrates that it is improper to rely on standard thyroid tests to determine a patient's optimal dose of thyroid replacement and doing so will result in inadequate replacement for the majority of patients. Thus, it is of no surprise that a large percentage of patients continue to suffer with symptoms of hypothyroidism despite being on so-called "proper" doses of thyroid, which is compounded by the fact that T4 only preparations are most often used.

This prospective study of 148 hypothyroid patients investigated the role of monitoring thyroid replacement with standard thyroid tests and the accuracy of such tests to determine the proper dose of thyroid replacement. The authors measured TSH, free T4, free T3, total T4 and total T3 and used a battery of clinical parameters and an exam by clinicians experienced in thyroid disease. This study found that the TSH is a poor measure for estimating the metabolic severity of primary thyroid failure and/or a proper thyroid dose.

The authors conclude, *"Measurements of serum concentrations of total thyroxine, free thyroxine and TSH, made with sensitive immunoradiometric assay, did not, except in patients with gross abnormalities, distinguish euthyroid [normal thyroid] patients from those who were receiving inadequate or excessive replacement. These measurements are therefore of little, if any, value in monitoring patients receiving thyroxine replacement...The serum concentration of thyroid stimulation hormone is unsatisfactory as the thyrotrophs in the anterior pituitary are more sensitive to changes in the concentration of thyroxine in the circulation than other tissues...It is clear that serum thyroid hormone and thyroid stimulating hormone concentrations cannot be used with any degree of confidence to classify patients as receiving satisfactory, insufficient, or excessive amounts of thyroxine replacement...The poor diagnostic sensitivity and high false positive rates associated with such measurements render them virtually useless in clinical practice...Further adjustments to the dose should be made according to the patient's clinical response...Our findings emphasize the need for laboratories to make their users aware that the reference ranges for thyroxine, free thyroxine, and thyroid stimulation hormone concentrations in patients receiving thyroxine replacement are considerably different from the conventional ranges; they should also point out limitations of these ranges."*

Most physicians, including endocrinologists, feel that a suppressed TSH is an indication that the dose of thyroid should be reduced (except with thyroid cancer). While a suppressed TSH may be an indication the patient is hyperthyroid, this study found that was the case only 20% of the time. In other words, doctors who make the assumption that a suppressed TSH means over-replacement and decrease the dose based on the suppressed TSH will be wrong 80% of the time because 80% of the time a suppressed TSH was shown not to be an indication that the patient was hyperthyroid or receiving too much thyroid replacement. Unfortunately, most physicians, including endocrinologists, lack of ability or confidence to clinically evaluate a patient's thyroid status and lack understanding of the limitations of standard thyroid function tests, which has resulted in the majority of hypothyroid patients receiving inadequate doses of thyroid replacement.