Which lab tests are best when you suspect hypothyroidism?

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Evidence-based answer

Thyroid-stimulating hormone (TSH) level is the preferred test for initial evaluation of suspected primary hypothyroidism (strength of recommendation [SOR]: **C**, expert opinion). If TSH is abnormal, a free thyroxine (T_4) level will further narrow the diagnosis. Obtain a triiodothyronine (T_3) level if TSH is undetectable and free T_4 is normal.

When assessing the adequacy of replacement therapy in primary hypothyroidism, the TSH is the most important parameter to monitor (SOR: **C**, expert opinion). Because TSH levels can't be used to monitor central hypothyroidism, use free T_4 and T_3 concentrations (SOR: **C**, case series).

Clinical commentary

A reasonable approach, yes, but more data are needed

In my practice, some patients ask for more testing than necessary, whereas others can't afford indicated interval lab tests. Ordering unnecessary screening tests or a batched thyroid panel is, too often, a simple but inappropriate clinician response.

Unfortunately, we must rely solely on expert opinion to guide laboratory testing for hypothyroidism. Nevertheless, the guidelines described in this Clinical Inquiry provide not only an appropriate algorithm for diagnosis, but also a logical basis on which to justify ongoing monitoring intervals.

Inconsistent use of laboratory testing among health care providers can lead to misdiagnosis, inappropriate changes in treatment, patient confusion, and added cost. Given the high incidence of hypothyroidism, evidence-based decision making could help avoid unnecessary testing and wasteful expenditure.

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FAST TRACK

TSH level is the preferred test for both initial evaluation of suspected primary hypothyroidism and monitoring treatment

Evidence summary

Hypothyroidism is a common condition, affecting 4.6% of the population in the United States, according to the National Health and Nutrition Examination Survey (NHANES III).[1] A statewide study in Colorado found the prevalence of elevated TSH levels to be 9.5%.[2] The study population was older and had more women, Caucasians, and high school and college graduates than the general population. Among the general population, the prevalence of unsuspected overt hypothyroidism has been reported to be 0 to 18 cases per 1000.[3]

No randomized controlled trials or other high-quality studies have addressed the question of what laboratory tests are most useful to diagnose and monitor the treatment of hypothyroidism.

CONTINUED

FAST TRACK

Test free T_4 if TSH is abnormal on initial evaluation; test T_3 if TSH is undetectable and free T_4 is normal

TSH is a cost-effective initial test, but has limitations

Experts recommend TSH level as the most cost-effective initial laboratory test for suspected primary hypothyroidism.[4] TSH had a high sensitivity (98%) and specificity (92%) when used to confirm thyroid disease in patients referred to a specialty endocrine clinic, but its positive predictive value is low when used as a screening test in primary care.[5]

TSH is a poor measure of the clinical severity of hypothyroidism. In one study, no correlation was found between serum TSH and clinical and metabolic markers—such as clinical score, ankle reflex time, total cholesterol, and creatine kinase—when estimating the severity of primary thyroid failure.[6]

Uses of free T_4, T_3, and imaging

If TSH is elevated, a free T_4 level can help differentiate between central hyperthyroidism and much more common peripheral hypothyroidism (99% of patients). A T_3 level is necessary only if the TSH is undetectable and the free T_4 is normal.[7,8] Imaging the thyroid gland is reserved for evaluating structural abnormalities.

When to reassess TSH

In primary hypothyroidism, reassess TSH 6 weeks after the start of treatment or a change in replacement dose.[4] This recommendation is based on the fact that levothyroxine has a half-life of about a week; a steady state would be achieved over the course of 5 half-lives. No direct patient-oriented evidence exists for this testing interval. Test free T_4 if you suspect excessive replacement or noncompliance.

Once TSH is in the normal range, experts recommend assessing the level after 6 months and then annually.[4] A 2005 study suggested lowering the target TSH level for assessing adequate replacement in patients treated with standard levothyroxine because subtherapeutic T_3 levels were found despite normal TSH levels in these patients.[9]

TSH can't be used to monitor therapy for central hypothyroidism. Follow both free T_4 and T_3 concentrations because elevated T_3 levels, indicative of overtreatment, can occur even when free T_4 measurements are normal in these patients.[10]

Recommendations

ACP *Medicine* recommends TSH as the initial test. If TSH is elevated, *ACP Medicine* advises confirmation with a repeat TSH plus a free T_4.[11] ■

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