Test Definition: THSCM

Thyroid Function Cascade, S

Overview

Useful For

Screening for a diagnosis of thyroid disease

Profile Information

Test ID	Reporting Name	Available Separately	Always Performed
STSHC	TSH, Sensitive, S	Yes, (order STSH)	Yes

Reflex Tests

Test ID	Reporting Name	Available Separately	Always Performed
FRT4C	T4 (Thyroxine), Free, S	Yes, (order FRT4)	No
TPOC	Thyroperoxidase Ab, S	Yes, (order TPO)	No
T3C	T3 (Triiodothyronine), Total, S	Yes, (order T3)	No

Testing Algorithm

If thyroid-stimulating hormone (TSH) is <0.3 mIU/L, then free T4 (FT4) is performed at an additional charge.

If FT4 is normal and the TSH is <0.1 mIU/L, then triiodothyronine (T3) is performed at an additional charge.

If TSH is >4.2 mIU/L, then FT4 and thyroperoxidase antibodies are performed at an additional charge.

See Thyroid Function Ordering Algorithm in Special Instructions.

Special Instructions

- Thyroid Function Ordering Algorithm

Method Name

Electrochemiluminescent Immunoassay

NY State Available

Yes

Specimen

Specimen Type

Serum

Specimen Required

Patient Preparation:

1. **For 12 hours before this test do not** take multivitamins or dietary supplements containing biotin (vitamin B7), which is commonly found in hair, skin, and nail supplements and multivitamins.

2. In patients receiving therapy with high biotin doses (ie, >5 mg/day), no specimen should be taken until at least 8 hours after the last biotin administration.

Container/Tube:

Preferred: Serum gel

Acceptable: Red top

Specimen Volume:1.5 mL

Collection Instructions:

1. Serum gel tubes should be centrifuged within 2 hours of collection.

2. Red-top tubes should be centrifuged and aliquoted within 2 hours of collection.

Specimen Minimum Volume

1 mL

Reject Due To

Gross hemolysis	Reject
Gross lipemia	OK
Gross icterus	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Refrigerated (preferred)	7 days	
	Frozen	30 days	
	Ambient	72 hours	

Clinical and Interpretive

Clinical Information

This test utilizes a cascaded testing procedure to efficiently evaluate and monitor functional thyroid status.

The cascade begins with thyroid-stimulating hormone (TSH) as a screening assay. In patients with an intact pituitary-thyroid axis, TSH provides a physiologic indicator of the functional level of thyroid hormone activity. Increased TSH indicates inadequate thyroid hormone, and suppressed TSH indicates excess thyroid hormone.

Transient TSH abnormalities may be found in seriously ill, hospitalized patients, so this is not the ideal setting to assess thyroid function. However, even in these patients, TSH works better than total thyroxine (an alternative

screening test).

When TSH is normal, no additional testing will be necessary. However, when the TSH result is abnormal, appropriate follow-up tests will automatically be performed.

If TSH is below 0.3 mIU/L or above 4.2 mIU/L, free thyroxine (FT4) is performed. The supplemental measurement of FT4 in patients with abnormal TSH measurements allows one to better assess the severity of the changes.

Serum triiodothyronine (T3) levels often are depressed in sick and hospitalized patients, caused in part by the biochemical shift to the production of reverse T3. Therefore, T3 generally is not a reliable predictor of hypothyroidism. However, in a small subset of hyperthyroid patients, hyperthyroidism may be caused by overproduction of T3 (T3 toxicosis). To help diagnose and monitor this subgroup, T3 is measured on all specimens with suppressed TSH and normal FT4 concentrations.

Detectable concentrations of antithyroperoxidase (anti-TPO) antibodies are observed in patients with autoimmune thyroiditis and may cause the destruction of thyroid tissue, eventually resulting in hypothyroidism. Anti-TPO antibodies are measured in all specimens with elevated TSH concentrations.

See Thyroid Function Ordering Algorithm in Special Instructions.

Reference Values

0-5 days: 0.7-15.2 mIU/L

6 days-2 months: 0.7-11.0 mIU/L

3-11 months: 0.7-8.4 mIU/L

1-5 years: 0.7-6.0 mIU/L

6-10 years: 0.6-4.8 mIU/L

11-19 years: 0.5-4.3 mIU/L

> or =20 years: 0.3-4.2 mIU/L

Interpretation

In primary hypothyroidism, thyroid-stimulating hormone (TSH) levels will be elevated. In primary hyperthyroidism, TSH levels will be low.

The ability to quantitate circulating levels of TSH is important in evaluating thyroid function. It is especially useful in the differential diagnosis of primary (thyroid) from secondary (pituitary) and tertiary (hypothalamus) hypothyroidism. In primary hypothyroidism, TSH levels are significantly elevated, while in secondary and tertiary hypothyroidism, TSH levels are low or normal.

Elevated or low TSH in the context of normal free thyroxine is often referred to as subclinical hypo- or hyperthyroidism, respectively.

Thyrotropin-releasing hormone (TRH) stimulation differentiates all types of hypothyroidism by observing the change in patient TSH levels in response to TRH. Typically, the TSH response to TRH stimulation is exaggerated in cases of primary hypothyroidism, absent in secondary hypothyroidism, and delayed in tertiary hypothyroidism. Most

individuals with primary hyperthyroidism have TSH suppression and do not respond to TRH stimulation test with an increase in TSH over their basal value.

Sick, hospitalized patients may have falsely low or transiently elevated TSH.

Cautions

For assays employing antibodies, the possibility exists for interference by human antianimal antibodies (ie, heterophile antibodies) in the patient specimen. Patients who have been regularly exposed to animals or have received immunotherapy or diagnostic procedures utilizing immunoglobulins or immunoglobulin fragments may produce antibodies (eg, human antimouse antibodies) that interfere with immunoassays. This may falsely elevate or falsely decrease the results. Interference due to extremely high titers of antibodies to analyte-specific antibodies, streptavidin or ruthenium can occur.

For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination, and other findings.(1)

Clinical Reference

1. Package insert: Roche TSH Reagent, Roche Diagnostics, Indianapolis, IN, 2010-08, V2

2. Fatourechi V, Lankarani M, Schryver P, et al: Factors influencing clinical decisions to initiate thyroxine therapy for patients with mildly increased serum thyrotropin (5.1-10.0 mIU/L). Mayo Clin Proc 2003 May;78(5):554-560

3. Wilson JD, Foster D, Kronenburg HM, et al: Williams Textbook of Endocrinology. Ninth edition. WB Saunders Company, 1998

4. Melmed S, Polonsky KS, Larsen PR, et al: Williams Textbook of Endocrinology. 12th edition. Elsevier Saunders Company, 2011, pp 348-414

5. Heil W, Ehrhardt V: Reference Intervals for Adults and Children 2008. Ninth edition. Roche Diagnostics Ltd, Rotkreuz, Switzerland July 2009, V9.1

Performance

Method Description

The cobas e immunoassay thyroid-stimulating hormone (TSH) method employs monoclonal antibodies specifically directed against human TSH. A biotinylated monoclonal TSH-specific antibody and a monoclonal TSH-specific antibody labeled with a ruthenium complex react to form a sandwich complex. After the addition of streptavidin-coated microparticles, the complex becomes bound to the solid phase via interaction of biotin and streptavidin. The reaction mixture is aspirated into the measuring cell where the microparticles are magnetically captured onto the surface of the electrode. Application of a voltage to the electrode then induces chemiluminescent emission, which is measured by a photomultiplier.(Package insert: Thyrotropin TSH, Roche Diagnostics Corporation, Indianapolis IN)

PDF Report

No

Day(s) and Time(s) Test Performed

Monday through Sunday; Continuously

Analytic Time

1 day

Maximum Laboratory Time

2 days

Specimen Retention Time

7 days

Performing Laboratory Location

Rochester

Fees and Codes

Fees

- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their Regional Manager. For assistance, contact Customer Service.

Test Classification

This test has been cleared or approved by the U.S. Food and Drug Administration and is used per manufacturer's instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA requirements.

CPT Code Information

84443-Thyroid-stimulating hormone-sensitive (s-TSH)

84439-T4 (thyroxine), free (if appropriate)

84480-T3 (triiodothyronine), total (if appropriate)

86376-Thyroperoxidase (TPO) antibodies (if appropriate)

LOINC® Information

Test ID	Test Order Name	Order LOINC Value
THSCM	Thyroid Function Cascade, S	11579-0

Result ID	Test Result Name	Result LOINC Value
STSHC	TSH, Sensitive, S	11579-0