Test Definition: T3FR

T3 (Triiodothyronine), Free, Serum

Overview

Useful For

A second- or third-level test of thyroid function

Confirmation of hyperthyroidism, supplementing the T4 (tetraiodothyronine), sensitive thyrotropin, and total T3 assays

Evaluating clinically euthyroid patients who have an altered distribution of binding proteins

Method Name

Electrochemiluminescence Immunoassay (ECLIA)

NY State Available

Yes

Specimen

Specimen Type

Serum

Specimen Required

Supplies: Sarstedt Aliquot Tube, 5 mL (T914)
Collection Container/Tube:
Preferred: Serum gel
Acceptable: Red top
Submission Container/Tube: Plastic vial
Specimen Volume: 1 mL
Collection Instructions: Centrifuge and aliquot serum into a plastic vial.

Specimen Minimum Volume

0.75 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)	14 days	
	Frozen	30 days	

Clinical & Interpretive

Clinical Information

Normally T3 (triiodothyronine) circulates tightly bound to thyroxine-binding globulin and albumin. Only 0.3% of the total T3 is unbound (free); the free fraction is the active form.

In hyperthyroidism, both T4 (thyroxine, tetraiodothyronine) and T3 levels (total and free) are usually elevated, but in a small subset of hyperthyroid patients (T3 toxicosis), only T3 is elevated. Generally, free T3 (FT3) measurement is not necessary since total T3 will suffice. However, FT3 levels may be required to evaluate clinically euthyroid patients who have an altered distribution of binding proteins (eg, pregnancy, dysalbuminemia).

Reference Values

Pediatric
0-1 month: 2.7-8.5 pg/mL
1-<12 months: 3.4-5.6 pg/mL
1-<14 years: 3.0-5.1 pg/mL
14-<19 years: 3.3-5.3 pg/mL

Adult (> or =19 years): 2.0-4.4 pg/mL

For International System of Units (SI) conversion for Reference Values, see www.mayocliniclabs.com/order-tests/si-unit-conversion.html.

Interpretation

Elevated free T3 (triiodothyronine) values are associated with thyrotoxicosis or excess thyroid hormone replacement.

Cautions

Free T3 (triiodothyronine) is not a sensitive test for hypothyroidism.

In rare cases, some individuals can develop antibodies to mouse or other animal antibodies (often referred to as human anti-mouse antibodies [HAMA] or heterophile antibodies), which may cause interference in some immunoassays. The presence of antibodies to streptavidin or ruthenium can also rarely occur and may interfere in this assay. Caution should be used in interpretation of results, and the laboratory should be alerted if the result does not correlate with the clinical presentation.

Serum biotin concentrations up to 1200 ng/mL do not interfere with this assay. Concentrations up to 1200 ng/mL may be present in specimens collected from patients taking extremely high doses of biotin up to 300 mg/d. In a study among 54 healthy volunteers, supplementation with 20 mg/d biotin resulted in a maximum serum biotin concentration of 355 ng/mL 1-hour postdose.

Clinical Reference

1. Peyro Saint Paul L, Debruyne D, Bernard D, Mock DM, Defer GL. Pharmacokinetics and pharmacodynamics of MD1003 (high-dose biotin) in the treatment of progressive multiple sclerosis. Expert Opin Drug Metab Toxicol. 2016;12(3):327-344
2. Grimsey P, Frey N, Bendig G, et al. Population pharmacokinetics of exogenous biotin and the relationship between biotin serum levels and in vitro immunoassay interference. J Pharmacokinet Pharmacodyn. 2017;2(4):247-256
3. Lee SY, Pearce EN. Hyperthyroidism: A Review. JAMA. 2023;330(15):1472-1483. doi:10.1001/jama.2023.19052
4. Freedman DB, Halsall D, Marhsall WJ and Ellervik C. Thyroid diseases. In: Rifai N, Horvath AR, Wittwer CT, eds: Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. 6th ed. Elsevier; 2018:1572-1616

Performance

Method Description

The Roche Elecsys FT3 III (free T3 [triiodothyronine]) is a competitive assay using electrochemiluminescence detection. The patient sample is incubated with a sheep polyclonal anti-T3 antibody labeled with ruthenium. Streptavidin-coated microparticles and biotinylated T3 are added for a second incubation during which the still free binding sites of the labeled antibody become occupied. The resulting immunocomplex becomes bound to the solid phase by 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. Unbound substances are removed and application of a voltage to the electrode induces the electrochemiluminescent emission. This signal is measured against a calibration curve to determine patient results.(Package insert: Elecsys FT3 III. Roche Diagnostics; 10/2022)

PDF Report

No

Day(s) Performed

Monday through Saturday

Report Available

1 to 3 days

Specimen Retention Time

14 days

Performing Laboratory Location

Mayo Clinic Laboratories - Rochester Superior Drive

Fees & 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 account representative. For assistance, contact Customer Service.

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Test Classification

This test has been cleared, approved, or is exempt by the US 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

84481

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
T3FR	T3 (Triiodothyronine), Free, S	3051-0

Result ID	Test Result Name	Result LOINC® Value
T3FR	T3 (Triiodothyronine), Free, S	3051-0