MAYO CLINIC LABORATORIES

Test Definition: FRT4

T4 (Thyroxine), Free, Serum

Overview

Useful For

Evaluating suspected thyroid function disorders using free thyroxine measured together with thyroid-stimulating hormone

Testing Algorithm

For information see Thyroid Function Ordering Algorithm.

Special Instructions

- Thyroid Function Ordering Algorithm

Method Name

Electrochemiluminescence Immunoassay

NY State Available

Yes

Specimen

Specimen Type

Serum

Specimen Required

Patient Preparation: For 12 hours before specimen collection do not take multivitamins or dietary supplements containing biotin (vitamin B7), which is commonly found in hair, skin, and nail supplements and multivitamins.
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.

Forms

If not ordering electronically, complete, print, and send a Renal Diagnostics Test Request (T830) with the specimen.

Specimen Minimum Volume

0.5 mL

Reject Due To

Gross	OK

hemolysis	
Gross lipemia	OK
Gross icterus	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Refrigerated (preferred)	14 days	
	Ambient	72 hours	
	Frozen	30 days	

Clinical & Interpretive

Clinical Information

Free thyroxine (FT4) comprises a small fraction of total thyroxine. FT4 is available to the tissues and is, therefore, the metabolically active fraction.

Elevations in FT4 cause hyperthyroidism, while decreases cause hypothyroidism.

Reference Values

Pediatric
0-5 days: 0.9-2.5 ng/dL
6 days-2 months: 0.9-2.2 ng/dL
3-11 months: 0.9-2.0 ng/dL
1-5 years: 1.0-1.8 ng/dL
6-10 years: 1.0-1.7 ng/dL
11-19 years: 1.0-1.6 ng/dL

Adult (> or =20 years): 0.9-1.7 ng/dL

For SI unit Reference Values, see www.mayocliniclabs.com/order-tests/si-unit-conversion.html

Interpretation

Elevated values suggest hyperthyroidism or exogenous thyroxine.

Decreased values suggest hypothyroidism.

Free thyroxine (FT4) works well to correct total T4 values for thyroxine-binding globulin alterations but may give misleading values when abnormal binding proteins are present or the patient has other major illnesses (euthyroid sick syndrome).

Cautions

Of 26 commonly used pharmaceuticals tested in vitro, only furosemide caused elevated free thyroxine (FT4) findings at the daily therapeutic dosage level.

The test cannot be used in patients receiving treatment with lipid-lowering agents containing dextrothyroxine (D-T4). If the thyroid function is to be checked in such patients, the therapy should first be discontinued for 4 to 6 weeks to allow the physiological state to become re-established.

Binding protein anomalies seen with familial dysalbuminemic hyperthyroxinemia, for example, may cause values which, while characteristic of the condition, deviate from the expected results.

For assays employing antibodies, the possibility exists for interference by human anti-animal antibodies (ie, heterophile antibodies) in the patient sample. 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 (HAMA) 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.

Clinical Reference

1. Melmed S, Polonsky KS, Larsen PR, Kronenberg H. Williams Textbook of Endocrinology. 12th ed. Saunders Company; 2011:348-414
2. Rifai N, Chiu RWK, Young I, Burnham CAD, Wittwer CT, eds. Tietz Textbook of Laboratory Medicine. 7th ed. Elsevier; 2023

Performance

Method Description

In the Roche free thyroxine (FT4) assay, the determination of free thyroxine is made with the aid of a specific anti-T4 antibody labeled with a ruthenium complex. After addition of biotinylated T4 and streptavidin-coated microparticles, the still-free binding sites of the labeled antibody become occupied, with formation of an antibody-hapten complex. The entire 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. Unbound substances are then removed with ProCell. Application of a voltage to the electrode then induces chemiluminescent emission which is measured by a photomultiplier.(Package insert: Elecsys FT4 II. Roche Diagnostics; 01/2019)

PDF Report

No

Day(s) Performed

Monday through Sunday

Report Available

Same day/1 to 2 days

Specimen Retention Time

7 days

Performing Laboratory Location

Mayo Clinic Laboratories - Rochester Main Campus

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.

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

84439

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
FRT4	T4 (Thyroxine), Free, S	83122-2

Result ID	Test Result Name	Result LOINC® Value
FRT4	T4 (Thyroxine), Free, S	83122-2