

Overview**Useful For**

Thyroxine (T4) and free T4 are measured together with thyroid-stimulating hormone when thyroid function disorders are suspected.

Profile Information

Test ID	Reporting Name	Available Separately	Always Performed
T4F	T4 (Thyroxine), Free, S	No	Yes
T4CC	T4 (Thyroxine), Total Only, S	No	Yes

Method Name

Electrochemiluminescence Immunoassay

NY State Available

Yes

Specimen**Specimen Type**

Serum

Specimen Required**Container/Tube:**

Preferred: Serum gel

Acceptable: Red top

Specimen Volume: 1 mL

Specimen Minimum Volume

0.625 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

THYROXINE (T4), TOTAL:

T4 is synthesized in the thyroid gland. T4 is metabolized to T3 peripherally by deiodination. T4 is considered a reservoir or prohormone for T3, the biologically most active thyroid hormone. About 0.05% of circulating T4 is in the free or unbound portion. The remainder is bound to thyroxine-binding globulin (TBG), prealbumin, and albumin.

The hypothalamus secretes thyrotropin-releasing hormone (TRH), which stimulates the pituitary to release thyroid-stimulating hormone (TSH). TSH stimulates the thyroid to secrete T4. T4 is partially converted peripherally to triiodothyronine (T3). High amounts of T4 and T3 (mostly from peripheral conversion of T4) cause hyperthyroidism.

T4 and T3 cause positive feedback to the pituitary and hypothalamus with resultant suppression or stimulation of the thyroid gland as follows: decrease of TSH if T3 or T4 is high (hyperthyroidism), and increase of TSH if T3 or T4 is low (hypothyroidism).

Measurement of total T4 gives a reliable reflection of clinical thyroid status in the absence of protein binding abnormalities. However, changes in binding proteins can occur which affect the level of total T4 but leave the level of unbound hormone unchanged.

THYROXINE (T4), FREE:

Free thyroxine comprises a small fraction of total thyroxine. The free T4 (FT4) is available to the tissues and is, therefore, the metabolically active fraction.

Elevations in FT4 cause hyperthyroidism, while decreases cause hypothyroidism.

Reference Values

T4 (THYROXINE), TOTAL ONLY

Adult (> or =20 years): 4.5-11.7 mcg/dL

Pediatric:

0-5 days: 5.0-18.5 mcg/dL

6 days-2 months: 5.4-17.0 mcg/dL

3 -11 months: 5.7-16.0 mcg/dL

1 -5 years: 6.0-14.7 mcg/dL

6 -10 years: 6.0-13.8 mcg/dL

11 -19 years: 5.9-13.2 mcg/dL

T4 (THYROXINE), FREE

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

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

Clinical Reference

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

Performance

Method Description

THYROXINE (T4), TOTAL:

Testing is performed on a Roche cobas instrument. The Roche thyroxine assay (T4) is a competitive assay using electrochemiluminescence detection. Bound T4 is released from binding proteins by 8-anilino-1-naphthalene sulfonic acid (ANS). Patient specimen is incubated with sheep polyclonal anti-T4 antibody labeled with ruthenium. Streptavidin-coated microparticles and biotinylated T4 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 then 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: Roche Cobas. Roche Diagnostics, Indianapolis, IN)

THYROXINE (T4), FREE:

Testing is performed on a Roche cobas immunoassay analyzer. 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: E 601/602, FT4. Roche Diagnostics Corporation, Indianapolis IN)

PDF Report

No

Day(s) and Time(s) Test Performed

Monday through Sunday; Continuously

Analytic Time

Same day/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

84436-Total

84439-Free

LOINC® Information

Test ID	Test Order Name	Order LOINC Value
T4FT4	T4 (Thyroxine), Total and Free	90224-7

Result ID	Test Result Name	Result LOINC Value
T4F	T4 (Thyroxine), Free, S	83122-2
T4CC	T4 (Thyroxine), Total Only, S	83119-8