

Overview

Useful For

Confirming or excluding metastases in enlarged or ultrasonographically suspicious lymph nodes from athyrotic individuals treated for differentiated thyroid cancer in conjunction with cytologic analysis

Confirming or excluding the presence of thyroid tissue in the biopsied area from athyrotic individuals treated for differentiated thyroid cancer in conjunction with cytologic analysis

This test is **not useful for** screening asymptomatic individuals for neoplastic disease.

Highlights

- Measurement of thyroglobulin in fine-needle aspiration biopsy (FNAB) needle washes improves the evaluation of suspicious lymph nodes in athyrotic patients suspected of metastatic differentiated follicular cell-derived thyroid carcinoma.
- Measurement of thyroglobulin is particularly useful in cases where the cytology result is not diagnostic or indeterminate.
- Interpretation of thyroglobulin concentrations in FNAB-needle washes from tissues other than lymph nodes is less well defined.

Method Name

Immunoenzymatic Assay

NY State Available

Yes

Specimen

Specimen Type

Fine Needle Wash

Necessary Information

The biopsied site of each specimen must be identified as from a lymph node or non-lymph node source, and the specific biopsy site must be clearly identified in LIS or on batch sheet.

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:** Plain, plastic, screw-top tube

**Specimen Volume:** 1 to 1.5 mL

Collection Instructions:

1. Needle wash specimens for analysis should be collected in conjunction with cytology specimens.
2. Have saline available prior to start of procedure. **Saline is the only acceptable solution for needle washings.**
3. After each fine-needle aspiration biopsy (FNAB) has been collected and the material in the needle has been expelled onto a slide for cytologic analysis, attach the used FNAB needle to an empty syringe.
4. Withdraw between 0.10 mL and 0.25 mL of saline up through the needle until the saline starts to fill the hub of the needle or end of the syringe.
5. Expel this fluid back through the needle into a separate plastic screw-top tube. This is the needle washing used for analysis.
6. Repeat steps 2 through 4 for each needle pass of the same biopsied site and empty into the same tube, accumulating a total of 0.5 mL to 1.5 mL of fluid to send to the laboratory. (If more than 1 site is biopsied, see Additional Information)
7. Inspect specimen for visible blood or tissue contamination:

a. If bloody, centrifuge specimen and transfer supernatant to a new plastic aliquot tube (5-mL standard tube) prior to sending to laboratory. The supernatant, not the cellular material, is used for analysis.

b. If specimen is clear, centrifugation is not necessary.

Additional Information

1. If more than 1 site is biopsied, each washing material should be submitted on a separate tube and under a different order number.
2. A minimum of 0.5 mL is required for testing; however, the total collection volume should not exceed 1.5 mL. Specimen volumes outside these parameters may be rejected.
3. Do not send a saline control. This test has been validated to rule-out saline matrix effect.

Forms

If not ordering electronically, complete, print, and send an [Oncology Test Request](#) (T729) with the specimen.

Specimen Minimum Volume

0.5 mL

Reject Due To

Gross hemolysis	Reject
Gross icterus	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Fine Needle Wash	Frozen (preferred)	90 days	
	Ambient	7 days	
	Refrigerated	14 days	

Clinical & Interpretive

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**Clinical Information**

Thyroglobulin (Tg) is a 660,000 Da glycoprotein produced exclusively by the follicular cells of the thyroid. Given the tissue specificity of Tg production, measurement of serum concentrations in athyrotic patients enables detection of persistence, recurrence, or metastasis of differentiated thyroid carcinoma. In addition, Tg measurement in biopsy specimens of nonthyroidal tissues may assist in confirming and localizing metastatic disease.

In papillary thyroid carcinoma (PTC), which accounts for greater than 80% of all thyroid cancer cases, most metastatic disease occurs in loco-regional lymph nodes in the neck, which are easily examined by ultrasound. Most suspicious nodes undergo ultrasonography-guided fine-needle aspiration biopsy (FNAB) for cytology examination to determine a diagnosis. Unfortunately, in up to 20% of cases, inadequate cellularity or nonrepresentative sampling precludes the diagnosis. Measurement of Tg in FNAB washes from lymph nodes suspected of metastatic PTC is used as an adjunct to cytology examination after ultrasonography-guided FNAB in situations where cytology is inconclusive. One of the advantages of the measurement of Tg in FNAB washes is that a dedicated needle pass is not necessary for analysis. Most often, the washout is performed by rinsing the FNAB needle with a small volume of saline immediately after the cellular component of the biopsy has been expelled for cytological examination.

The diagnostic performance of Tg in FNAB washouts often allows for the accurate diagnosis of cases in which cytology is nondiagnostic. A meta-analysis of 24 studies and 2865 lymph nodes reported a pooled sensitivity of 95% and specificity of 94% for detection of metastatic PTC. The diagnostic performance of Tg in FNAB washes is superior in athyrotic patients. In studies that included patients with the thyroid gland, the sensitivity was 86.2% and specificity was 90.2%. Including only patients after thyroidectomy showed improved performance with a sensitivity of 96.9% and specificity of 94.1%. In an in-house study, a Tg cut-off of 1 ng/mL for FNAB-needle wash specimens provided 100% sensitivity and 96.2% specificity for the detection of metastatic thyroid carcinoma in lymph nodes from athyrotic patients. The diagnostic performance of Tg at the 1-ng/mL cut-off compared favorably with cytology (95.1% overall agreement) and allowed accurate diagnosis in 18 of the 19 cases in which cytology was nondiagnostic or not performed. A number of professional guidelines recommend the measurement of Tg in FNAB washouts from lymph nodes in cases of inadequate cytology or cases with conflicting cytological and ultrasound evaluations.

Interpretation of Tg concentrations in FNAB needle washes from tissues other than lymph nodes is not well defined and needs to be considered on a case-by-case basis. The most established use is to determine the tissue origin of a thyroid mass/nodule or other neck mass/nodule that is suspected to be thyroid derived. This can be accomplished by measuring Tg, calcitonin and parathyroid hormone in the lesion. Measurement of Tg in thyroid bed tissue in patients, who underwent total thyroidectomy and radioactive iodine ablation, is a relatively frequent application of Tg testing and may differentiate scar tissue from residual normal thyroid tissue. Occasionally lesions in other organs might be biopsied to determine by Tg measurement if they are thyroid derived, if cytology/histology is not informative.

**Reference Values**

Lymph node:  $\leq 1.0$  ng/mL

This cutoff has been validated for total needle wash volumes of  $\leq 1.5$  mL of normal saline. If wash volumes are substantially larger, a lower cutoff might apply.

Non-lymph node: An interpretive report will be provided.

**Interpretation**

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**Lymph Nodes:**

In athyrotic patients with a history of differentiated thyroid carcinoma, thyroglobulin (Tg) concentration greater than 1.0 ng/mL in the fine-needle aspiration biopsy (FNAB) needle wash suggests the presence of metastatic differentiated follicular cell-derived thyroid carcinoma in the biopsied area.

Tg measurements yield reliable results in most cases with nondiagnostic cytology and are approximately equal in diagnostic accuracy to cytological examinations that are deemed sufficient for diagnosis.

**Non-lymph nodes:**

When measuring Tg in FNAB needle washes from thyroid bed tissue after total thyroidectomy and radioactive iodine ablation to differentiate thyroid versus scar tissue, an undetectable Tg concentration is consistent with the absence of thyroid-derived tissue (including thyroid carcinoma) at the site biopsied. Detectable Tg concentration is consistent with the presence of thyroid-derived tissue, but it is not indicative of the presence of malignancy.

Measurement of Tg in FNAB needle washes from a thyroid nodule may be used to distinguish parathyroid versus follicular cell derived and C-cell derived thyroid tissue but cannot identify a malignant process in the nodule.

For all other biopsied sites, eg, lung, kidney, liver, brain, bone, and various other sites, absence of measurable Tg in FNAB needle washes is consistent with the absence of thyroid-derived tissue (including thyroid carcinoma) at the site biopsied. A detectable Tg concentration is consistent of the presence of thyroid-derived tissue, but it is not necessarily indicative of the presence of malignancy.

**Cautions**

This test has been validated only in single lymph nodes from athyrotic patients. While the needle washes from several distinct needle passes or aspirations from a single node should be pooled, biopsies from different nodes or other sites such as thyroid bed should be submitted as separate specimens.

Do not interpret fine-needle aspiration biopsy (FNAB) - thyroglobulin (Tg) levels as absolute evidence of the presence or absence of malignant disease. Results should be used in conjunction with information from the clinical evaluation of the patient, cytology, and imaging procedures.

Immunometric assays can, in rare occasions, be subject to interferences such as "hooking" at very high analyte concentrations (false-low results). If the clinical picture does not fit the laboratory result, this possibility should be considered. While autoantibody interference (typically false-low results in immunometric assays) is reported to not be an issue for FNAB-needle wash specimens, the report was based on a small number of cases; therefore, the possibility of autoantibody interference should also be considered.

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. Caution should be used in interpretation of results and the laboratory should be alerted if the result does not correlate with the clinical presentation.

Results are dependent on accurate sampling and a maximum needle wash volume of less than or equal to 1.5 mL.

FNAB needle wash results should always be interpreted in the context of systemic circulating serum Tg concentrations, particularly in cases where the needle wash is visibly blood contaminated.

**Clinical Reference**

1. Grani G, Fumarola A: Thyroglobulin in lymph node fine-needle aspiration washout: a systematic review and meta-analysis of diagnostic accuracy. J Clin Endocrinol Metab. 2014 Jun;99(6):1970-1982
2. Snozek CLH, Chambers EP, Reading CC, et al: Serum thyroglobulin, high-resolution ultrasound, and lymph node thyroglobulin in diagnosis of differentiated thyroid carcinoma nodal metastases. J Clin Endocrinol Metab. 2007 Nov;92(11):4278-4281
3. Algeciras-Schimmich A: Thyroglobulin measurement in the management of patients with differentiated thyroid cancer. Crit Rev Clin Lab Sci. 2018 May;55(3):205-218

**Performance****Method Description**

Testing is performed using the Beckman Access thyroglobulin (Tg) assay, a simultaneous 1-step immunoenzymatic (sandwich) assay performed on the Beckman Coulter UniCel Dxl 800. A sample is added to a reaction vessel along with a biotinylated mixture of 4 mouse monoclonal anti-Tg antibodies, streptavidin-coated paramagnetic particles, and mouse monoclonal anti-Tg antibody-alkaline phosphatase conjugate. The biotinylated antibodies and the sample Tg bind to the solid phase, while the conjugate antibody reacts with a different antigenic site on the Tg molecule. After incubation in a reaction vessel, materials bound to the solid phase are held in a magnetic field, while unbound materials are washed away. The chemiluminescent substrate Lumi-Phos530 is added to the vessel and light generated by the reaction is measured with a luminometer. Light production is directly proportional to the concentration of Tg in the sample. The amount of analyte in the sample is determined from a stored, multipoint calibration curve.(Package insert: Access Thyroglobulin Assay. Beckman Coulter, Inc; 2021)

For all samples with Tg concentrations greater than 1.0 ng/mL, a dilution series is performed. A linear dilution excludes hooking and most major interferences. Samples that contain Tg of 1.0 ng/mL or less are spiked with exogenous Tg to identify possible interferences that may cause a false-low result.

**PDF Report**

No

**Day(s) Performed**

Monday through Saturday

**Report Available**

1 to 3 days

**Specimen Retention Time**

12 months

**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](#).

Test Classification

This test has been modified from the manufacturer's instructions. Its performance characteristics were determined by Mayo Clinic in a manner consistent with CLIA requirements. This test has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information

84432

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
TFNAB	Thyroglobulin, FNAB Needle Wash	53922-1

Result ID	Test Result Name	Result LOINC® Value
TFNA3	Thyroglobulin, FNAB, Lymph Node	53920-5
TFNA4	Thyroglobulin, FNAB, Non Lymph Node	53922-1
TFNA5	Thyroglobulin, FNAB, Interpretation	69053-7
TFNA6	Lymph Node (LN) or Non-LN Source	31208-2
TFNA7	Site Location	39111-0