MAYO CLINIC LABORATORIES

# Test Definition: TAB

Thyroid Autoantibodies Profile, Serum

## Overview

### Useful For

As an adjunct in the diagnosis of autoimmune thyroid diseases: Hashimoto disease, postpartum thyroiditis, neonatal hypothyroidism, and Graves disease

Differentiating thyroid autoimmune disorders from nonautoimmune goiter or hypothyroidism

As a diagnostic tool in deciding whether to treat a patient who has subclinical hypothyroidism

### Profile Information

| Test Id | Reporting Name | Available Separately | Always Performed |
|---|---|---|---|
| TPO | Thyroperoxidase Ab, S | Yes | Yes |
| TGAB | Thyroglobulin Antibody, S | Yes | Yes |

### Method Name

Immunoenzymatic Assay

### NY State Available

Yes

## Specimen

### Specimen Type

Serum Red

### Ordering Guidance

If thyroglobulin tumor marker testing is desired, order HTG2 / Thyroglobulin, Tumor Marker, Serum.

### Specimen Required

**Patient Preparation:** For 12 hours before specimen collection, patient **should not** take multivitamins or dietary supplements (eg, hair, skin, and nail supplements) containing biotin (vitamin B7).
**Supplies:** Sarstedt Aliquot Tube 5 mL (T914)
**Collection Container/Tube:** Red top
**Submission Container/Tube:** Plastic vial
**Specimen Volume:** 1 mL serum
**Collection Instructions:** Centrifuge and aliquot serum into a plastic vial.

### Specimen Minimum Volume

Serum: 0.5 mL

### Reject Due To

| | |
|---|---|
| Gross hemolysis | Reject |
| Gross lipemia | OK |
| Gross icterus | Reject |

### Specimen Stability Information

| Specimen Type | Temperature | Time | Special Container |
|---|---|---|---|
| Serum Red | Refrigerated (preferred) | 7 days | |
| | Ambient | 7 days | |
| | Frozen | 30 days | |

## Clinical & Interpretive

### Clinical Information

Thyroglobulin antibody:
Thyroglobulin autoantibodies bind thyroglobulin (Tg), a major thyroid-specific protein. Tg plays a crucial role in thyroid hormone synthesis, storage, and release.

Thyroglobulin autoantibodies bind thyroglobulin is not secreted into the systemic circulation under normal circumstances. However, follicular destruction through inflammation (thyroiditis and autoimmune hypothyroidism), hemorrhage (nodular goiter), or rapid disordered growth of thyroid tissue, as may be observed in Graves disease or follicular cell-derived thyroid neoplasms, can result in leakage of Tg into the blood stream. This results in the formation of autoantibodies to Tg (anti-Tg) in some individuals. The same processes also may result in exposure of other "hidden" thyroid antigens to the immune system, resulting in the formation of autoantibodies to other thyroid antigens, in particular thyroid peroxidase (TPO) (anti-TPO). Since anti-Tg and anti-TPO autoantibodies are observed most frequently in autoimmune thyroiditis (Hashimoto disease), they were originally considered to be of possible pathogenic significance in this disorder. However, the consensus opinion today is that they are merely disease markers. It is felt that the presence of competent immune cells at the site of thyroid tissue destruction in autoimmune thyroiditis simply predisposes the patient to form autoantibodies to hidden thyroid antigens.

In individuals with autoimmune hypothyroidism, 30% to 50% will have detectable anti-Tg autoantibodies, while 50% to 90% will have detectable anti-TPO autoantibodies. In Graves disease, both types of autoantibodies are observed at approximately half of these rates.

The presence of anti-Tg, which occurs in 15% to 30% of thyroid cancer patients, could result in misleading Tg results. In immunometric assays, the presence of thyroid antibody can lead to false-low measurement, whereas it might lead to false-high results in competitive assays.

Thyroperoxidase:
Thyroperoxidase (TPO) is an enzyme involved in thyroid hormone synthesis, catalyzing the oxidation of iodide on

tyrosine residues in thyroglobulin for the synthesis of triiodothyronine and thyroxine (tetraiodothyronine). TPO is a membrane-associated hemo-glycoprotein expressed only in thyrocytes and is one of the most important thyroid gland antigens.

Disorders of the thyroid gland are frequently caused by autoimmune mechanisms with the production of autoantibodies. Anti-TPO antibodies activate complement and are thought to be significantly involved in thyroid dysfunction and the pathogenesis of hypothyroidism.

The determination of TPO antibody levels is the most sensitive test for detecting autoimmune thyroid disease (eg, Hashimoto thyroiditis, idiopathic myxedema, and Graves disease), and detectable concentrations of anti-TPO antibodies are observed in most patients with these disorders. The highest TPO antibody levels are observed in patients suffering from Hashimoto thyroiditis. In this disease, the prevalence of TPO antibodies is about 90% of cases, confirming the autoimmune origin of the disease. These autoantibodies also frequently occur (60%-80%) in the course of Graves disease.

In patients with subclinical hypothyroidism, the presence of TPO antibodies is associated with an increased risk of developing overt hypothyroidism. Many clinical endocrinologists use the TPO antibody test as a diagnostic tool in deciding whether to treat a patient with subclinical hypothyroidism, and Mayo Clinic Laboratories endorses this practice.

For more information, see Thyroid Function Ordering Algorithm.

## Reference Values

THYROGLOBULIN ANTIBODY
<4.0 IU/mL
Reference values apply to all ages.

THYROPEROXIDASE ANTIBODIES
<9.0 IU/mL
Reference values apply to all ages.

## Interpretation

Diagnosis of Autoimmune Thyroid Disease:
Measurements of antithyroperoxidase (anti-TPO) have higher sensitivity and equal specificity to antithyroglobulin (anti-Tg) measurements in the diagnosis of autoimmune thyroid disease. Anti-Tg levels should, therefore, only be measured if anti-TPO measurements are negative, but clinical suspicion of autoimmune thyroid disease is high. Detection of significant titers of anti-Tg or anti-TPO autoantibodies is supportive evidence for a diagnosis of Graves disease in patients with thyrotoxicosis. However, measurement of the pathogenic antithyrotropin (anti-thyroid stimulating hormone)) receptor antibodies by binding assay (THYRO / Thyrotropin Receptor Antibody, Serum) or bioassay (TSI / Thyroid-Stimulating Immunoglobulin, Serum) is the preferred method of confirming Graves disease in atypical cases and under special clinical circumstances.

Positive thyroid autoantibody levels in patients with high-normal or slightly elevated serum thyrotropin levels predict the future development of more profound hypothyroidism.

Patients with postpartum thyroiditis with persistently elevated thyroid autoantibody levels have an increased likelihood of permanent hypothyroidism.

In cases of neonatal hypothyroidism, the detection of anti-TPO or anti-Tg in the infant suggests transplacental antibody transfer, particularly if the mother has a history of autoimmune thyroiditis or detectable thyroid autoantibodies. The neonatal hypothyroidism is likely to be transient in these cases.

In patients with subclinical hypothyroidism, the presence of thyroperoxidase (TPO) antibodies predicts a higher risk of developing overt hypothyroidism, 4.3% per year versus 2.1% per year in antibody-negative individuals. Furthermore, it raises the concern that such patients may be at increased risk of developing other autoimmune diseases, such as adrenal insufficiency and type 1 diabetes.

The frequency of detectable anti-TPO observed in nonimmune thyroid disease is similar to the 10% to 12% observed in a healthy population with normal thyroid function.

There is a good association between the presence of autoantibodies against TPO and histological thyroiditis. However, in view of the extensive regenerative capacity of the thyroid under the influence of thyrotropin, chronic thyroid disease may be present for years before the clinical manifestation of hypothyroidism becomes evident, if ever.

## Cautions

Antithyroglobulin (anti-Tg) and antithyroperoxidase (anti-TPO) values determined by different methodologies might vary significantly and cannot be directly compared with one another. Some patients might show to be antibody-positive by some methods and antibody-negative by others. Comparing anti-Tg and anti-TPO values from different methods might lead to erroneous clinical interpretation.

Moderately increased levels of thyroperoxidase antibodies may be found in patients with a non-thyroid autoimmune disease such as pernicious anemia, type I diabetes, or other disorders that activate the immune system.

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.

## Clinical Reference

1 Sapin P, d'Herbomez M, Gasser F, Meyer L, Schlienger JL. Increased sensitivity of a new assay for anti-thyroglobulin antibody detection in patients with autoimmune thyroid disease. Clin Biochem. 2003;36(8):611-616. doi:10.1016/s0009-9120(03)00114-0
2. Saravanan P, Dayan CM. Thyroid autoantibodies. Endocrinol Metab Clin North Am. 2001;30(2):315-337
3. Baloch Z, Carayon P, Conte-Devolx B, et al. Laboratory medicine practice guidelines. Laboratory support for the diagnosis and monitoring of thyroid disease Thyroid 2003;13(1):3-126
4. Algeciras-Schimnich A. Thyroglobulin measurement in the management of patients with differentiated thyroid cancer. Crit Rev Clin Lab Sci. 2018;55(3):205-218. doi:10.1080/10408363.2018.1450830
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6. Feldt-Rasmussen U. Analytical and clinical performance goals for testing autoantibodies to thyroperoxidase, thyroglobulin, and thyrotropin receptor. Clin Chem. 1996;42(1):160-163
7. Gharib H, Tuttle RM, Baskin HJ, et al. Consensus Statement #1: Subclinical thyroid dysfunction: a joint statement on management from the American Association of Clinical Endocrinologists, the American Thyroid Association, and the

Endocrine Society. Thyroid. 2005;15(1):24-28. doi:10.1089/thy.2005.15.24
8. Freedman DB, Halsall D, Marshall WJ, Ellervik C. Thyroid disorders. 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

Thyroglobulin antibody:
The Access Thyroglobulin Antibody II assay (TgAb) is a sequential 2-step immunoenzymatic (sandwich) assay. A sample is added to a reaction vessel with paramagnetic particles coated with the thyroglobulin protein. The serum TgAb binds to the thyroglobulin. After incubation in a reaction vessel, materials bound to the solid phase are held in place by a magnetic field, while unbound materials are washed away. The thyroglobulin-alkaline phosphatase conjugate is added and binds to the TgAb. After the second incubation, materials bound to the solid phase are held in place by a magnetic field, while unbound materials are washed away. Then, the chemiluminescent substrate is added to the reaction vessel and light generated by the reaction is measured with a luminometer.(Package insert: Access Thyroglobulin Antibody II. Beckman Coulter, Inc; 04/2020)

Thyroperoxidase antibody:
The Access TPO (thyroperoxidase) Antibody assay is a sequential 2-step immunoenzymatic (sandwich) assay. A sample is added to a reaction vessel with paramagnetic particles coated with thyroperoxidase protein. The serum TPO antibody binds to the thyroperoxidase. After incubation in a reaction vessel, materials bound to the solid phase are held in a magnetic field while unbound materials are washed away. Protein A-alkaline phosphatase conjugate is added and binds to the TPO antibody. After the second incubation, materials bound to the solid phase are held in a magnetic field while unbound materials are washed away. The chemiluminescent substrate Lumi-Phos 530 is added to the vessel and light generated by the reaction is measured with a luminometer. The light production is directly proportional to the concentration of TPO antibody in the sample. The amount of analyte in the sample is determined from a stored, multipoint calibration curve. The analyte in the calibrator is traceable to international standard WHO 66/387.(Package insert: Access TPO Antibody. Beckman Coulter, Inc; 06/2020)

### 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.

### 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

86376-Thyroperoxidase antibody
86800-Thyroglobulin antibody

### LOINC® Information

| Test ID | Test Order Name | Order LOINC® Value |
|---|---|---|
| TAB | Thyroid Autoantibodies Profile, S | 87556-7 |

| Result ID | Test Result Name | Result LOINC® Value |
|---|---|---|
| TGAB | Thyroglobulin Antibody, S | 56536-6 |
| TPO | Thyroperoxidase Ab, S | 8099-4 |