

REF



AU242002

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### Intended Use

The Aurora Total Triiodothyronine Assay is a chemiluminescent microparticle immunoassay (CMIA) for the quantitative determination of Total Triiodothyronine (TT3) in human serum and plasma. The assay kit is intended for in vitro diagnostic use.

### Summary

The thyroid gland mainly secretes two thyroid hormones, one of which is tetraiodide Thyroxine, or thyroxine (T4), accounts for 93%; the other is triiodothyronine (T3), which accounts for 7%; and is 20% in T3 circulating in the blood. It is produced by the thyroid gland, and 80% is converted from T4 by the liver under the action of 5'-deio dinase (5'-DI). T3 secretion is regulated by the negative feedback mechanisms that the thyroid, pituitary, and hypothalamus participate in. Despite the low serum concentration of T3, the physiological efficacy of T3 is much greater than that of T4. In the circulation, the 99.7% binding of T3 to translating is reversible, mainly thyroxine-binding globulin (TBG) and small amounts of albumin and thyroid-binding prealbumin (TBPA). T3 that does not bind to or in the free state has metabolic activity, while T3 that binds to transporter does not have metabolic activity and exists as a reserve for free T3.

### Test Principles

The Total Thyroxine assay is a quantitative competitive immunoassay to determine the presence of TT3 in human serum and plasma using CMIA technology with flexible assay protocols.

1. Sample, assay auxiliary and paramagnetic anti-T3 coated microparticles are mixed, T3 present in the sample is displaced from the T4 binding protein and binds to anti-T3 coated microparticles, forming an antigen antibody complex.
2. After incubation, a conjugate containing acridinium-labeled T3 is added to the reaction mixture and binds to unoccupied binding sites of the anti-T3 coated microparticles.
3. After further incubation and washing, Pre-Trigger

and Trigger Solutions are added to the reaction mixture.

4. The resulting chemiluminescent reaction is measured as relative light units (RLUs). There is a relationship between the amount of TT3 in the sample and the RLUs detected by the optical system. Results are calculated automatically based on the previously established calibration curve.

### Reagents

R1	3.0 mL
R2	3.0 mL
R3	3.0 mL
CAL	Contains 3 levels, 1.0 mL each level
CON	Contains 2 levels, 1.0 mL each level
R1:	Microparticles. Anti-T3 coated microparticles. Preservative: 0.05% ProClin 300
R2:	Conjugate. Acridinium-labeled T3. Preservative: 0.05% ProClin 300
R3:	Assay auxiliary. 8-Anilino-1-naphthalenesulfonic acid (ANS).
CAL:	Calibrator. Solutions of different concentrations of T3. Preservative: 0.05% ProClin 300
CON:	Control. Tris buffer solution for quality control of Total Triiodothyronine (TT3)

### Required Materials

- Pre-Trigger Solution: Hydrogen peroxide solution.
- Trigger Solution: Sodium hydroxide solution.
- Wash Buffer: Phosphate buffered saline solution with 0.05% ProClin 300.

### Safety Precautions

- Exercise the normal precautions required for handling all laboratory reagents.
- Disposal of all waste material should be in accordance with local guidelines.
- Wear gloves when handling specimens or reagents.
- Clean and disinfect all spills of specimens or reagents using a suitable disinfectant.
- Trigger solution contains sodium hydroxide (NaOH) and should be avoided contact with eyes.

**Warning** (Contains Proclin 300)

Hazardous Component: 0.05% Proclin 300

- Reaction mass of:  
5-chloro-2-methyl-4-isothiazolin [EC no. 247-500-7]  
and 2-methyl-4-isothiazolin-3-one [EC no.  
200-239-6] (3:1)

## Hazard Statement

- H317: May cause an allergic skin reaction.
- H319: Causes serious eye irritation.
- H410: Very toxic to aquatic life with long-lasting effects.

## Precautionary Statement

- P261: Avoid breathing dust/fume/gas/mist/vapors/spray.
- P264: Wash hands thoroughly after handling.
- P272: Contaminated work clothing should not be allowed out of the workplace.
- P280: Wear protective gloves/protective clothing/eye protection/face protection.
- P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P337+P313: If eye irritation persists: Get medical advice/attention.
- P333+P313: If skin irritation or rash occurs: Get medical advice/attention.
- P302+P352: IF ON SKIN: Wash with plenty of soap and water.
- P321: Seek immediate care from a doctor.
- P363: Wash contaminated clothing before reuse.
- P273: Avoid release to the environment.
- P391: Collect spillage.
- P501: Dispose of contents/container in a safe way.

## Reagent Handling

- Do not use reagent kits beyond the expiration date.
- Do not pool reagents within a kit or between kits.
- Before loading the reagent kit on the system for the first time, the microparticle bottle requires mixing to resuspend microparticles that may have settled during shipment.
- Septums MUST be used to prevent reagent evaporation and contamination and to ensure

reagent integrity. Reliability of assay results cannot be guaranteed if septums are not used according to the instructions in this package insert.

- To avoid contamination, wear clean gloves when placing a septum on an uncapped reagent bottle.
- Once a septum has been placed on an open reagent bottle, do not invert the bottle as this will result in reagent leakage and may compromise assay results.

## Reagent Storage

REAGENT	Storage Temperature	Maximum Storage Time
Unopened	2°C~8°C Do not freeze.	12 months
On board/ Opened	2°C~8°C Do not freeze.	28 days

- Reagents may be stored on or off the chemiluminescence immunoassay analyzer. If reagents are removed from the analyzer, store them at 2-8°C (with septums and replacement caps) in an upright position. For reagents stored off the system, it is recommended that they be stored in their original trays and boxes to ensure they remain upright. If the microparticle bottle does not remain upright (with a septum installed) while in refrigerated storage off the system, the reagent kit must be discarded.

## Calibrator & Control Storage

CAL	CON	Storage Temperature	Maximum Storage Time
Unopened		2°C~8°C	12 months
Opened		2°C~8°C	30 days

## Applicable Analyzer

Automatic Chemiluminescence Immunoassay Analyzer (model: Aurora S-01).

## Specimen Types

Verified specimen types to be used with this assay:

Specimen Types	Collection Tubes
Serum	Serum separator tubes (SST)
Plasma	Dipotassium EDTA Tripotassium EDTA

	Sodium heparin Lithium heparin powder Plasma separator tubes (PST) -lithium heparin gel
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- Other specimen collection tube types have not been tested with this assay.
- Liquid anticoagulants may have a dilution effect resulting in lower concentrations for individual patient specimens.
- The instrument does not provide the capability to verify specimen type. It is the responsibility of the operator to verify that the correct specimen types are used in the assay.

### Specimen Conditions

Do not use specimens with the following conditions:

- Heat-inactivated
- Pooled
- Grossly hemolyzed (> 500 mg/dl hemoglobin)
- Obvious microbial contamination
- Fungal growth
- For accurate results, serum and plasma specimens should be free of fibrin, red blood cells, and other particulate matter. Serum specimens from patients receiving anticoagulant or thrombolytic therapy may contain fibrin due to incomplete clot formation.
- To prevent cross contamination, use of disposable pipettes or pipette tips is recommended.

### Preparation for Analysis

- Follow the tube manufacturer’s processing instructions for collection tubes. Gravity separation is not sufficient for specimen preparation.
- Mix thawed specimens thoroughly by low speed vortexing or by inverting 10 times. Visually inspect the specimens. If layering or stratification is observed, continue mixing until specimens are visibly homogeneous.
- Avoid more than 1 freeze/thaw cycles.
- To ensure consistency in results, specimens must be transferred to a centrifuge tube and centrifuged for a minimum of 30,000 g-minutes before testing if they contain fibrin, red blood cells, or other particulate matter, they were previously frozen.

- Examples of acceptable time and force ranges that meet this criterion are listed in the table below. Centrifugation time using alternate Relative Centrifugal Force values (RCF) can be calculated using the following formula:

Centrifugation Time (Minutes)	RCF (×g)	g × minutes
10	3,000	30,000
15	2,000	30,000
20	1,500	30,000

- Transfer clarified specimen to a sample cup or secondary tube for testing. For centrifuged specimens with a lipid layer, transfer only the clarified specimen and not the lipemic material.
- Inspect all specimens for bubbles. Remove bubbles with an applicator stick before analysis. Use a new applicator stick for each specimen to prevent cross contamination.

### Specimen Storage

Specimen Type	Storage Temperature	Maximum Storage Time
Serum/Plasma	Room temperature	≤ 8 hours
	2°C~8°C	≤ 3 days
	-20°C	≤ 90 days

- Remove serum or plasma from the clot, red blood cells, or separator gel if stored longer than the maximum room temperature storage time.
- Remove serum or plasma from the clot, red blood cells, or separator gel if stored longer than the maximum 2-8°C storage time and store frozen.
- Frozen specimens must be mixed thoroughly after thawing.
- Use caution in handling patient specimens to prevent cross-contamination.
- Do not exceed the storage limitations listed above.

### Assay Procedure

- Refer to the system operating instruction or the online help system for detailed information on preparing the system.
- Before loading the reagent kit on the system for

the first time, the microparticle bottle requires mixing to resuspend microparticles that may have settled during shipment. After the first time the microparticles have been loaded, no further mixing is required.

- Invert the microparticle bottle 30 times. Visually inspect the bottle to ensure microparticles are resuspended. If microparticles are still adhered to the bottle, continue to invert the bottle until the microparticles have been completely resuspended. If the microparticles do not resuspend, DO NOT USE. Once the microparticles have been resuspended, place a septum on the bottle.
- Load the reagent kit on the chemiluminescence immunoassay analyzer.
- Verify that all necessary reagents are present.
- Verify adequate sample volume is present prior to running the test.
- Sample volume for first test: 250  $\mu$ L
- Sample volume for each additional test from same sample cup: 30  $\mu$ L
- The test-specific parameters stored in barcode on the reagent pack are read in. In cases the barcode cannot be read, enter the sequence numbers
- Order calibration, if necessary.
- Prepare Total Triiodothyronine Calibrators and Controls.
- Mix calibrator(s) and controls by gentle inversion before use.
- Hold bottles vertically and dispense recommended volumes into each respective sample cup.
- Place the calibrators in the calibrator rack in the sample zone.
- Calibration.
- Load samples. For information on loading samples, refer to the Analyzer's Operations Manual.
- Press RUN.
- The chemiluminescence immunoassay analyzer performs all the functions automatically and calculates the results.

For optimal performance, it is important to perform routine maintenance as described in the Analyzer's Operations Manual. Perform maintenance more

frequently when required by laboratory procedures.

## Sample Dilution Procedures

Samples cannot be diluted for TT3 determinations. Samples which read > 6.51 ng/mL should be reported as such.

## Calibration

- Traceability: This assay has been standardized against the IRMM-469.
- Every TT3 assay kit has a two-dimension code label containing the predefined master curve of the particular reagent lot.
- Test Calibrators in duplicate. The calibrators should be priority loaded. A replicate of each control level must be tested to evaluate the assay calibration. Ensure that assay control values are within the ranges specified in the respective control package insert.
- Once calibration is accepted and stored, all subsequent samples may be tested without further calibration unless:
  - After 28 days when using the same lot reagent.
  - A reagent kit with a new lot number is used.
  - Controls are out of range.
  - Required by pertinent regulations.
  - Assay may also need to be recalibrated after specified service procedures have been performed or maintenance to critical part or subsystems that might influence the performance of the assay. For detailed information on how to perform an assay calibration, refer to the Analyzer's Operations Manual.
- Calibration Range: 0.195 ng/mL~6.51 ng/mL.

## Quality Control Procedures

- Order Control, if necessary.
- The recommended control requirement for the TT3 assay is that a single replicate of each control level be tested:
  - Once every 24 hours each day of use
  - After performing calibration
  - After instrument service procedures or maintenance that may affect assay performance have been performed.
- If the quality control procedures in your

laboratory require more frequent use of controls to verify test results, follow your laboratory-specific procedures.

- Each laboratory should establish control ranges to monitor the acceptable performance of the assay. If a control is out of its specified range, the associated sample results are invalid and the samples must be retested. Recalibration may be indicated.
- These results should be applied to your laboratory’s quality control practices. In addition, the laboratory must ensure that the matrix of the control material is suitable for use in the assay per the assay package insert.
- Unless specified, target values and ranges provided with the commercial control product insert are guidelines only and should not be used for quality control purposes.
- Refer to Clinical and Laboratory Standards Institute (CLSI) Document C24-A3, or other published guidelines for general quality control recommendations.

## Results

### Calculation

- The analyzer automatically calculates the concentration of each sample. The results are given in nmol/L.

### Alternate Result Units

- The default result unit for the TT4 assay is nmol/L. When the alternate result unit, µg/dL, is selected, the conversion factor used by the system is 0.651.
- Conversion Formula:
- $(\text{Concentration in ng/dL}) \times (0.651) = \text{Concentration in nmol/L.}$

### Limits

- Results should be used in conjunction with other data; e.g., symptoms, results of other tests, and clinical impressions.
- If the TT3 results are inconsistent with clinical evidence, additional testing is recommended.
- Specimens from patients who have received preparations of mouse monoclonal antibodies for diagnosis or therapy may contain human

anti-mouse antibodies (HAMA). Such specimens may show either falsely elevated or depressed values when tested with assay kits that employ mouse monoclonal antibodies. Additional information may be required for diagnosis.

- Heterophilic antibodies in human serum can react with reagent immunoglobulins, interfering with in vitro immunoassays. Patients routinely exposed to animals or to animal serum products can be prone to this interference, and anomalous values may be observed. Additional information may be required for diagnosis.
- Rheumatoid factor (RF) in human serum can react with reagent immunoglobulins, interfering with in vitro immunoassays. Additional information may be required for diagnosis.
- The Aurora Total Triiodothyronine assay is susceptible to interference effects from triglycerides at > 500 mg/dL.

### Expected Values

- It is recommended that each laboratory establish its own reference range, which may be unique to the population it serves depending upon geographical, season, patient, dietary, or environmental factors. A study was performed based on guidance from Clinical and Laboratory Standards Institute (CLSI) C28-A3c.
- Human serum specimens from apparently healthy individuals were collected the 148 specimens, 75 were female and 73 were male, age between 21 and 90 years.

The population	n	Reference range*
Apparently healthy individuals	148	0.96 ng/mL~1.95 ng/mL

\*According to the 92.5<sup>th</sup>-97.5<sup>th</sup> percentile.

\*Representative data; results in individual laboratories and in different geographical areas may vary from these data.

### Specific Performance Characteristics

- Data in the section SPECIFIC PERFORMANCE CHARACTERISTICS were generated using the Aurora S-01 Automatic Chemiluminescence Immunoassay

Analyzer System.

- Assay results obtained in individual laboratories may vary from data presented.

### Limit of Blank (LoB)

- The Limit of Blank was determined in accordance with the CLSI (Clinical and Laboratory Standards Institute) EP17-A requirements.
- The Limit of Blank is the 95th percentile value from  $n \geq 20$  measurements of analyte-free samples over several independent series. The Limit of Blank corresponds to the concentration below which analyte-free samples are found with a probability of 95 %.
- The observed LoB value was  $\leq 0.195$  ng/mL.

### Accuracy

#### Intra Assay Variation

- Within run variation was determined by replicate determination ( $n=10$ ) of three different control sera in one assay. The within assay variability is  $\leq 8.0\%$ .

#### Inter Assay Variation

- Between run variation was determined by replicate measurements ( $n=10$ ) of three different control sera in 3 different lots. The between assay variability is  $\leq 15.0\%$ .

Intra-Assay, n=10			Inter-Assay, n=10×3		
Sample	Mean (ng/mL)	CV	Sample	Mean (ng/mL)	CV
1	1.022	4.71%	1	1.017	4.58%
2	4.073	3.64%	2	4.224	5.29%

### Linearity

- The linearity was determined in accordance with the CLSI (Clinical and Laboratory Standards Institute) EP6-A requirements.
- The linearity range was verified by more than 6 concentration levels which encompass or be equal to the minimum and the maximum values of linearity range and duplicate assays ( $n=3$ ) at all levels.
- The Aurora Total Triiodothyronine assay has been demonstrated to be linear from 0.195 ng/mL to 6.51

ng/mL, regression  $\geq 0.99$  and max diff  $\leq 15\%$  in this interval.

### Specificity

#### Cross-Reactivity

- A study was performed based on guidance from CLSI EP7-A2.
- The cross-reactants listed below (Using TT3-free samples) were evaluated to determine whether TT3 concentrations were affected when using the Aurora Total Triiodothyronine assay.

Cross-Reactant	Cross-Reactant Concentration	Results
T4	500 ng/mL	$\leq 2.0$ ng/mL
T3	50 ng/mL	$\leq 2.0$ ng/mL

### Interference

- A study was performed based on guidance from CLSI EP7-A2.
- Potentially interfering substances were evaluated to determine whether TT3 concentrations were affected when using the Aurora Total Triiodothyronine assay. Samples containing the potential interferents were prepared at two TT3 concentrations. The samples were assayed, and the TT3 concentrations of the spiked samples were compared to the reference samples.

Potential Interferent	Interferent Concentration	% Interferent Bias
Bilirubin	20 mg/dL	$\leq 10\%$
Hb	500 mg/dL	$\leq 10\%$
Intralipid	1000 mg/dL	$\leq 10\%$
Total protein	10 g/dL	$\leq 10\%$
RF	1000IU/mL	$\leq 10\%$
ANA	400AU/mL	$\leq 10\%$
HAMA	600ng/mL	$\leq 10\%$

### Reference

1. Yen PM. Physiological and molecular basis of thyroid hormone action[J]. *Physiol Rev*, 2001, 81(3):1097 -1142.
2. Marsden P, McKerron CG. Serum triiodothyronine: concentration in the diagnosis of

hyperthyroidism. Clin Endocrin 1975; 4:183.

3. Larsen PR. Triiodothyronine: Review of Recent Studies of Its Physiology and Pathophysiology in Man. Metabolism 1972; 21:1073-1092.

4. DeGroot L, Larsen PR, Refetoff S, Stanbury JB. Transport of Thyroid Hormone and Cell Uptake. In: The Thyroid and Its Diseases. New York: Wiley and Sons, 1984;62-66.

5. Robbins J, Rall JE. The Iodine-Containing Hormones. In: Hormones in Blood (3rd Ed.). London: Academic Press, 1979:1:632-667.

CON

Control

### Contact Information

EC REP

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IVD

Release Date: ... .. Date of Manufacture: ... ..

### Symbols



Manufacturer



Date of manufacture



Use-by date



Contains sufficient for <n> tests



Consult instructions for use



Biological risks



Temperature limit



CE Marking

EC REP

EU Representative

IVD

In Vitro diagnostic medical device

REF

Catalogue Number

LOT

Batch code

REAGENT

Reagent

R1

Microparticles

R2

Conjugate

R3

Assay auxiliary.

CAL

Calibrator